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***Japan***

**SURVEY REPORT ON RESEARCH ACTIVITIES  
IN PRIVATE ENTERPRISES**

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SCIENCE & TECHNOLOGY  
JAPAN

SURVEY REPORT ON RESEARCH ACTIVITIES  
IN PRIVATE ENTERPRISES

92FE0584A Tokyo SCIENCE AND TECHNOLOGY AGENCY REPORT in Japanese Feb 92  
pp 1-139

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## **Survey Report on Research Activities in Private Enterprises**

92FE0584A Tokyo SCIENCE AND TECHNOLOGY AGENCY REPORT in Japanese Feb 92 pp 1-139

### **[Text] I. Outline of Survey**

#### **1. Outline of Survey**

In recent years, Japan's rise as an economic power has been astounding, and its international influence that is attendant upon that grows stronger. On the other hand, though, the international environment surrounding Japan has become increasingly more fierce, as shown in the trend of rising trade friction.

In such a situation, an important issue for Japan is to endeavor to raise S&T levels through continued strengthening of its basic research, and to aim for the creation of S&T results that can become international contributions.

In this the R&D activities of private enterprises, which account for about three-fourths of the money used in Japan for research, become increasingly important. In recent years, many private enterprises—more so than in the past—are emphasizing R&D activities. They are seen as playing an even greater role in raising the level of Japan's S&T and in producing international research results. In this sense, the structure of private enterprises' R&D and its changes are gaining attention.

While continuing to keep these things in mind, our intentions in carrying out this survey are that it will grasp the actual state of affairs in the globalization of private enterprises' R&D activities, and that it will be of use in drawing up and promoting future S&T policies.

#### **2. Subjects and Method of the Survey**

The subjects of this survey were private enterprises (1,301 companies) with at least ¥1 billion in capital that carry out R&D activities. We conducted a questionnaire survey by mail.

### 3. Period of the Survey

We carried out the survey in June 1991.

The figures reported in the survey for amount of capital, number of employees, and number of researchers were as of 31 March 1991. Those for sales and R&D incomes and expenditures were for FY90, and all other figures were those at the time the questionnaire was filled in.

### 4. Responses to the Survey

Of the 1,031 companies to which we sent the survey, 852 companies responded (65.5% recovery rate), and 831 companies provided valid responses (63.9% valid response rate). Tables 1 and 2 show the breakdowns of the enterprises that provided valid responses by type of industry and by scale of capital.

Table 1. Breakdown by Type of Industry of Enterprises Providing Valid Responses

Type of industry	831 enterprises
1) Agriculture, forestry, and fisheries	5
2) Mining	4
3) Construction	82
4) Food processing	50
5) Textiles	26
6) Pulp and paper	19
7) Printing and publishing	3
8) Synthetic chemicals	62
9) Oils, fats, and paints	11
10) Pharmaceuticals	38
11) Other chemicals	35
12) Petroleum and coal products	18
13) Plastic products	18
14) Rubber products	6
15) Ceramics	32
16) Iron and steel	36
17) Nonferrous metals	30
18) Metal products	23
19) Machinery	64
20) Electrical machinery and appliances	84
21) Communications, electronics, and electrical measuring instruments	39
22) Automobiles	47
23) Other transport machinery	18
24) Precision machinery	24
25) Other industries	14
26) Transportation, communications, and public utilities	26
27) Other types of industries	17

Note: Synthetic chemicals indicate chemical fertilizers, inorganic chemicals, organic chemicals, and chemical fibers.



Table 2. Breakdown by Scale of Capital of Enterprises Providing Valid Responses

Scale of capital	831 enterprises
1) ¥1~5 billion	308
2) ¥5~10 billion	199
3) ¥10~50 billion	240
4) 50~100 billion	45
5) More than ¥100 billion	39

## II. Sales, R&D Expenditures, Number of Researchers, etc.

The following is an outline of the FY91 sales, R&D expenditures, number of researchers, etc., of the 831 companies that provided valid responses to the survey.

### 1. Sales

The total amount of FY91 sales of the enterprises that responded to the survey was ¥207.7555 trillion. By type of industry, the automobile industry had the largest sales (¥29.7589 trillion). That is followed by the electrical machinery and appliance industry (¥26.36 trillion); transportation, communications, and public utilities (¥25.6313 trillion); and the construction industry (¥24.7889 trillion).

### 2. R&D Expenditures

R&D expenditures in FY91 were ¥7.4022 trillion in total and ¥8.9 billion per company.

By type of industry, the largest amounts spent for R&D per company were those by the automobile industry (¥23.1 billion); the communications, electronics, and electrical measuring instruments industry (¥21.3 billion); and the electrical machinery and appliance industry (¥21 billion). By scale of capital, the larger the scale, the greater is the amount of R&D expenditures per company. Enterprises with ¥1~5 billion in capital spent ¥1.3 billion per company, whereas enterprises with more than ¥100 billion spent ¥86.8 billion per company.

Looking at the ratios of R&D expenditures to sales by type of industry, the percentages are the highest for the so-called high-tech industries: pharmaceuticals, 11.0%; communications, electronics, and electrical measuring instruments, 8.6%; precision machinery, 6.7%; and electrical machinery and appliances, 6.5%. The average over all the types of industries was 3.6% (Figure 3). Looking at this according to the scale of capital, the percentage of sales for which R&D expenditures account is always larger for those enterprises with the greatest amount of capital: for enterprises with ¥1~5 billion, it was 2.4%, whereas for enterprises with more than ¥100 billion it was 4.3%.

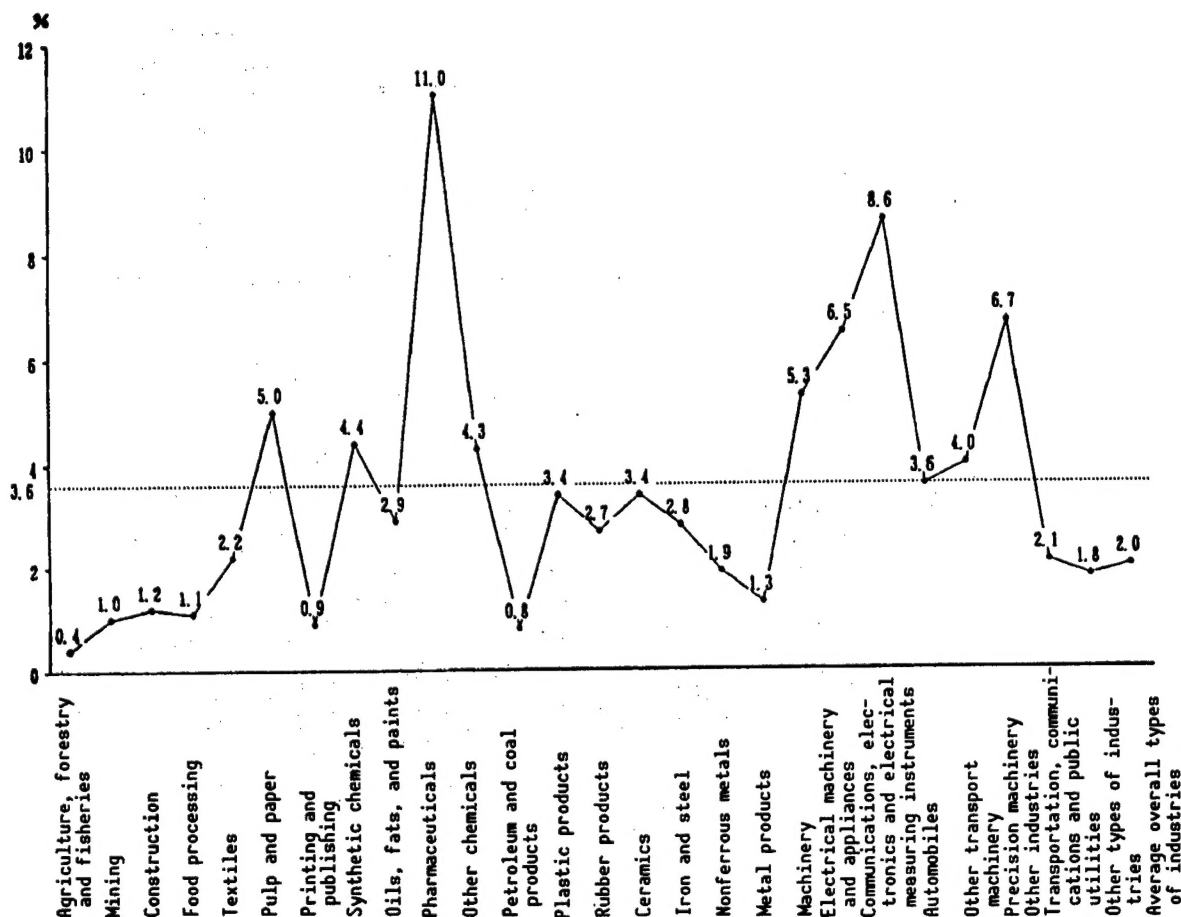


Figure 3. Percentage of Sales Spent on R&D

### 3. Number of Researchers

The total number of full-time researchers as of 31 March 1991 was 214,921. By type of industry, that was in the order of electrical machinery and appliances (50,322 researchers); communications, electronics, and electrical measuring instruments (27,347); and automobiles (26,883). Looking at the number of researchers per company by type of industry, enterprises in the communications, electronics, and electrical measuring instruments industry had 701 researchers per company, which was the most. That was followed by 599 in the electrical machinery and appliance industry and 572 in the automobile industry. The average over all types of industries was 259 researchers per company. Looking at this according to the scale of capital, there were more full-time researchers per company for those enterprises with the largest amounts of capital: for enterprises with ¥1-5 billion there were 47 researchers per company, whereas for enterprises with more than ¥100 billion there were 1,832.

The percentage of the total number of employees that are full-time researchers was highest for the communications, electronics, and electrical measuring instruments industry, 13.7%. That was followed by 13.4% for the oils, fats,

and paints industry; and 13.3% for "other" chemicals. The average over all the types of industries was 6.3%.

Incidentally, the number of foreign researchers employed in the enterprises that responded to the survey was 683. By type of industry, the nonferrous metals industry had 168 foreign researchers; the electrical machinery and appliance industry, 105; and the machinery industry, 89.

#### **4. Number of Patents Held**

The 368,964 patents held in Japan as of 31 March 1991 amount to 466 patents per company. By type of industry, the electrical machinery and appliance industry had 95,102 patents. That is followed by the communications, electronics, and electrical measuring instruments industry, with 44,174 patents; the synthetic chemicals industry, 40,303; and the automobile industry, with 31,452. The numbers of patents held per company by type of industry is in the order of the electrical machinery and appliance industry, with 1,219 patents per company; and the communications, electronics, and electrical measuring instruments industry, 1,162. By scale of capital, enterprises with more capital had more patents per company: enterprises with ¥1-5 billion held 92 patents per company, whereas enterprises with more than ¥100 billion had 3,499.

The 273,997 patents held outside of Japan amount to 360 patents per company. By type of industry, the electrical machinery and appliance industry had 57,014 patents. That is followed by the automobile industry, with 34,185 patents outside of Japan; and the synthetic chemicals industry, with 32,554. The numbers of patents held per company by type of industry is in the order of the precision machinery industry, with 1,007 patents per company; the automobile industry, 760; and the electrical machinery and appliance industry, 750. Looking at this by scale of capital, there are very large differences depending on the scale of capital: enterprises with ¥1-5 billion held 43 patents per company, whereas enterprises with more than ¥100 billion had 2,070.

#### **5. Sales and Research Expenditures of Overseas Affiliated Firms**

The total amount of sales by overseas affiliated firms (50% or more financed) was ¥28.8 trillion, and their research expenditures were ¥367.9 billion. The percentage of sales for which research expenditures account in overseas affiliated firms was 1.28%. According to this survey, the types of industries where overseas affiliated firms had the most research expenditures were the automobile and the electrical machinery and appliance industries.

#### **6. Other**

Although the subjects of the "FY1991 Survey Report on S&T Research" by the Management and Coordination Agency's Statistics Bureau are different from the subjects of this survey, a comparison of the FY1990 R&D expenditures of companies from that report with the R&D expenditures from this survey is given for reference in Table 4.

Table 4. Comparison With the Survey Report on S&amp;T Research

Category	This survey	S&T research survey
R&D outlays	¥7.4022 trillion	¥9.246 trillion
Ratio of R&D outlays to sales	3.56%	2.78%
Subjects of survey	Private firms with ¥1 billion or more in capital that do R&D 1,301 companies	Companies with ¥5 million or more in capital  About 12,700 companies
Recovery, etc.	Valid responses from 831 companies (63.9%) of the 1,301 surveyed	After recovering 80% of the responses from 12,700 subjects, 900 secondary samples were chosen from the 2,500 unrecovered samples, and questionnaires relating to these secondary samples were collected

### III. Summary of Survey Results

#### 1. Perception of International Situation in Relation to S&T

##### (1) Comparison of R&D Strength With U.S. and Europe

We asked about how private firms in Japan think the relative position of their company's R&D strength in its respective industrial category compares with that of similar industries in the United States and Europe five years ago, now, and five years from now.

Looking at the overall trends, most firms think that five years ago the relative positioning was "United States > Europe > Japan," but most think that it is now "Japan = United States = Europe" and that in five years it will be "Japan > United States > Europe." According to this, many Japanese firms think that Japan's R&D strength was inferior to that of the United States and Europe five years ago, but that it has come up to par in the last five years; they predict that Japan will overtake the United States and Europe after five years (Figure 5). The total numbers of responses that Japan is stronger than the United States and Europe (the total for Japan > United States > Europe, Japan > Europe > United States, and Japan > United States = Europe) grow quickly—20% five years ago, 32% now, and 44% after five years. In contrast, the responses that the United States is the strongest and that Europe is the strongest rapidly decrease along the advance of time from five years ago to now to five years later (Figure 6).

By type of industry, most firms in the precision machinery industry, where Japan has strong technological power, consistently answered "Japan > United

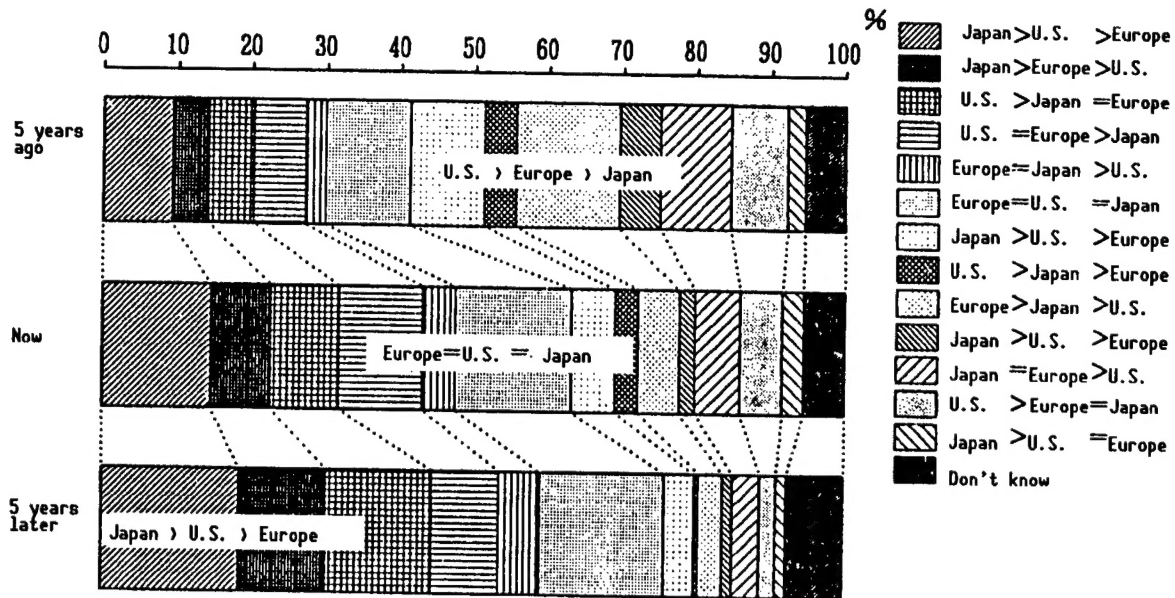


Figure 5. Comparison With R&D Strength of the United States and Europe

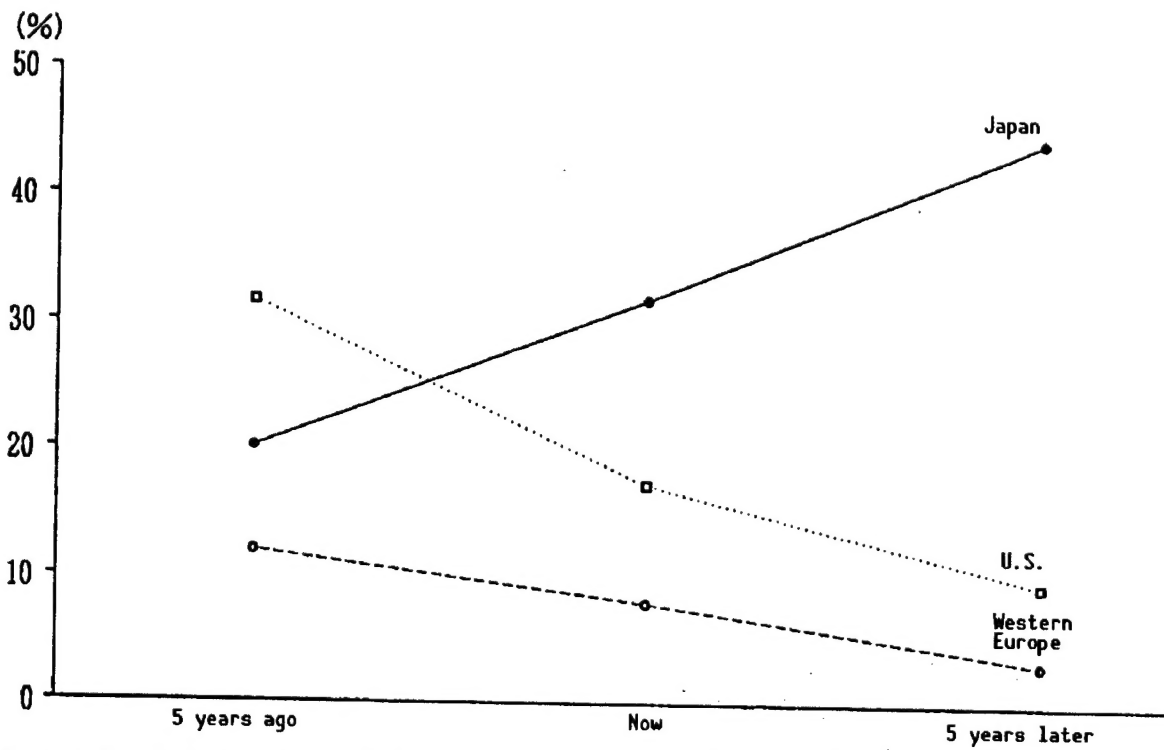


Figure 6. Changes in Relative Superiority of Japan's R&D Strength With That of the United States and Europe (Total numbers of responses that the firms in the respective countries are tops in R&D strength)

States > Europe" from five years ago until after five years. Most firms in the electrical machinery and appliance industry said "United States > Japan > Europe" for five years ago only, and "Japan > United States > Europe" now and after five years. In contrast, most pharmaceuticals firms responded that until now the United States and Europe have been dominant, but "Japan = United States = Europe" after five years. The petroleum and coal products industry was unique in that most firms from that industry said "United States > Europe > Japan" even after five years. Most firms in the iron and steel and machinery industries consistently answered "Japan > Europe > United States" from five years ago until after five years; a distinguishing characteristic here is that these firms think that Europe is stronger than the United States. The automobile industry is also one of Japan's strong industries. Most automobile firms said "Japan > United States > Europe" five years ago until now, but "Japan > Europe > United States" after five years. The responses that Europe's R&D strength will rise above that of the United States is worth noting.

## (2) Future International Situation in Connection With S&T

In the international situation surrounding Japan, various problems in the economic face of things are arising, number one of which is trade problems. We asked the firms what they think about this situation as it relates to S&T: 62% answered that "competition involving S&T among Japan, Europe and the United States will exist in the future, too, but there are also continuing efforts that grope for cooperation in regions, so tense international relations will continue partly and intermittently"; 17% answered that "because other countries will also be building up their S&T strength, which is the wellspring of economic power, tense international relations in connection with S&T (technology disputes, etc.) will become more intense." Taken together, these responses that tense international relations in connection with S&T "will continue to be tense" and "will grow more tense" account for 79% of all the responses to this question. It appears that the majority of firms grasp the international situation in connection with S&T as becoming more severe from now on (Figure 7). This relates to the fact that many firms predict that Japan's R&D strength will surpass that of the United States and Europe after five years.

We asked those firms that responded that "tense relations will continue" or that they "will grow more tense" about how they will cope with the situation if tense international relations do not disappear. Only 15% said that they "will not deal with it in any active way," 36% said "R&D cooperation," 28% said "technology transfer," and 12% said "establishing R&D strongpoints overseas." From this we gather that the attitude of firms is to actively cope with the situation (Figure 8).

## (3) Technological Strength of the Asian NIEs

Many private firms think that Japan's R&D strength is now at about the same level as that of Europe and the United States, and that after five years it will surpass that of Europe and the United States. When we asked them how they view the technological strength in the same category of industry of the Asian NIEs (in particular, Korea and Taiwan), which are geographically close to

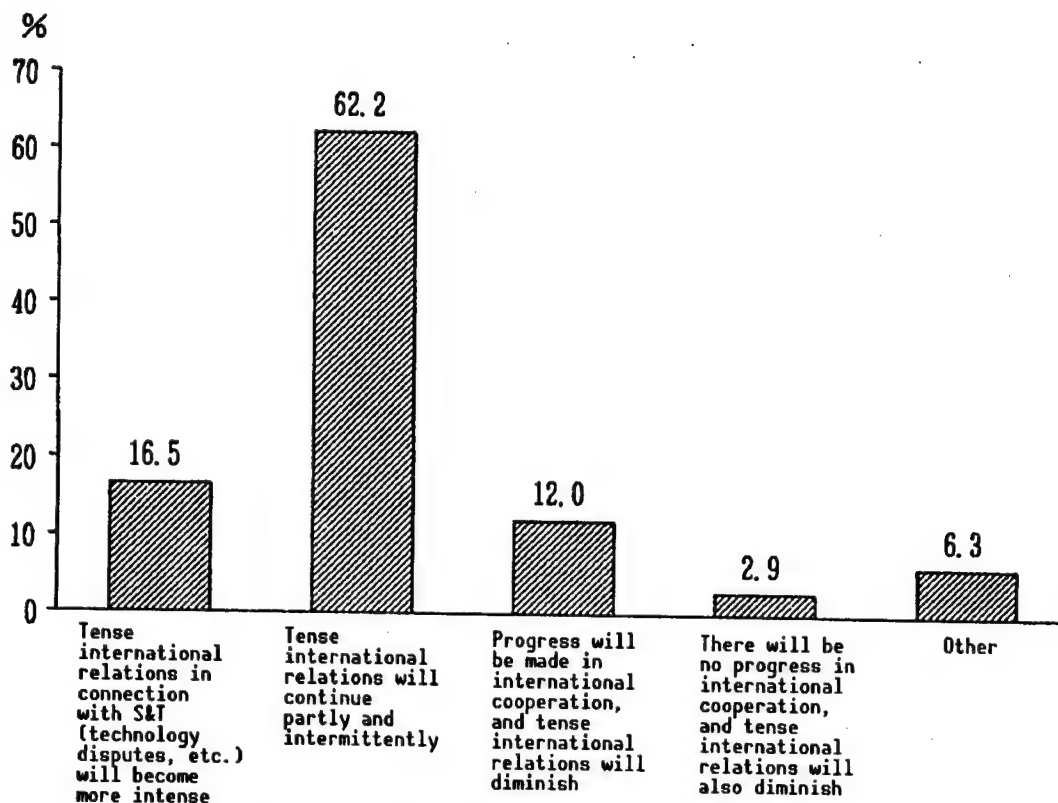


Figure 7. International Situation in Connection With S&T

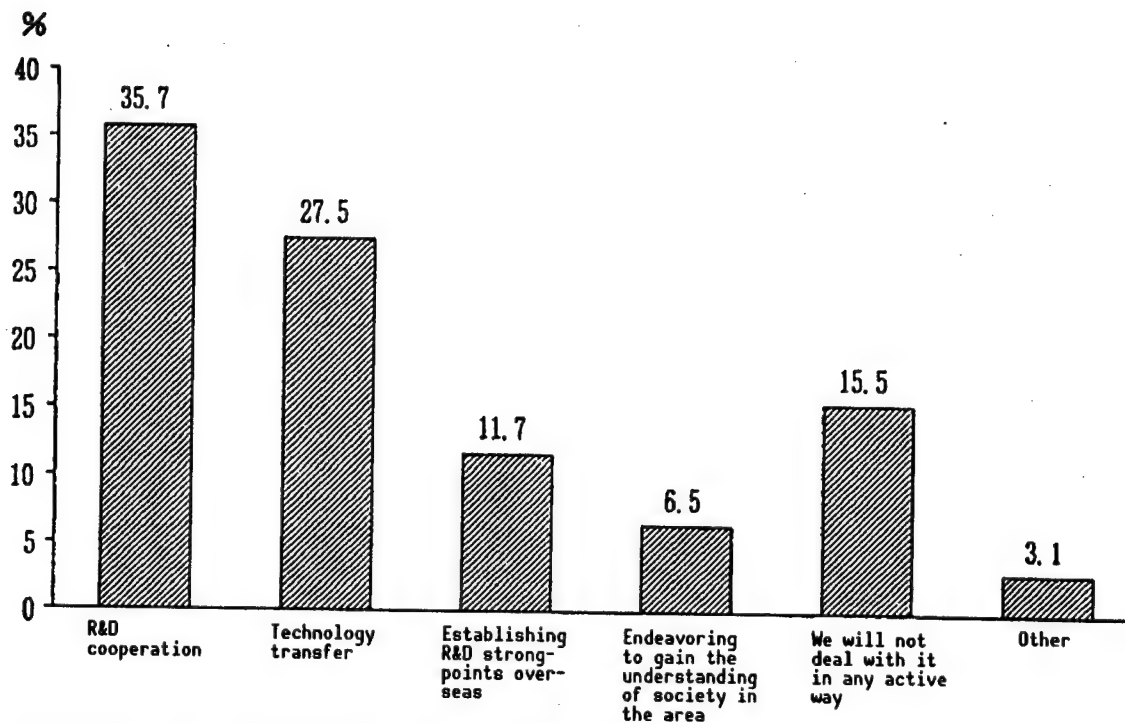


Figure 8. How Firms Will Cope If Tense International Relations Do Not Disappear



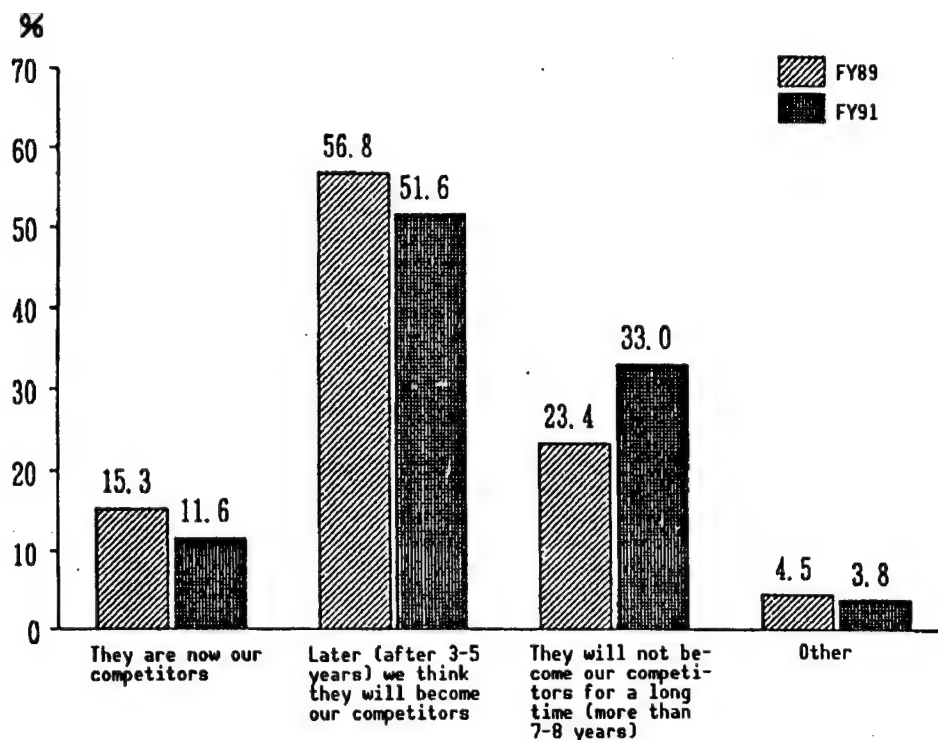


Figure 9. Technological Strength of Asian NIEs in Same Categories of Industry

Japan, 12% said that "they are now our competitors," 52% said that "later (after 3 to 5 years) we think they will become our competitors," and 33% said that "they will not become our competitors for a long time (more than 7 or 8 years)" (Figure 9). By type of industry, most of the firms that answered "they are now our competitors" were in materials-type industries, such as textiles, 31%, and iron and steel, 25%. There was an especially large number of pharmaceuticals firms, 70%, that answered "they will not become our competitors for a long time (more than 7 or 8 years)."

When we compared these results with those from the FY89 survey, the numbers of firms that answered "they are now our competitors" and "later they will become our competitors" decreased, whereas those that answered "they will not become our competitors for a long time" increased. This is thought to indicate that the technological strength of Japan's private firms has achieved growth that is higher than the growth of the Asian NIEs technological strength in recent years.

## 2. State of Globalization of Private Enterprises' R&D Activities

### (1) State of Ownership of Overseas R&D Strongpoints

Japan's private firms are expanding their activities internationally, and, starting with sales strongpoints, they are setting up production strongpoints and even R&D strongpoints overseas. So when we looked at the state of



ownership of overseas R&D strongpoints (strongpoints where two or more researchers do R&D work; includes overseas affiliated firms that are 50% or more financed), we found that, overall, 117 firms (14%) have R&D strongpoints overseas and there were 276 of these overseas R&D strongpoints in total. That amounts to 2.4 overseas R&D strongpoints for each firm that has them. The largest number of such strongpoints is 14. By scale of capital, the largest number of such strongpoints is 4 for firms with ¥1-5 billion in capital, 10 for firms with between ¥10-50 billion, and 14 for firms with more than ¥100 billion. Firms with the larger amounts of capital have a greater number of overseas R&D strongpoints.

By type of industry, the electrical machinery and appliance industry has 54 overseas R&D strongpoints (19 companies), followed by the machinery industry with 36 (13 companies), the automobile industry with 30 (15 companies), and the pharmaceuticals industry with 20 (13 companies). Conversely, there were only a few types of industries that do not have a single overseas R&D strongpoint: construction; plastic products; and transportation, communications, and public utilities, among others. By scale of capital, 36% (14 companies) of the firms with more than ¥100 billion in capital and 49% (22 companies) with ¥50-100 billion have R&D strongpoints overseas. In contrast, that percentage is generally low for firms with less than ¥50 billion in capital, and 5% (14 companies) of the firms with ¥1-5 billion have R&D strongpoints overseas.

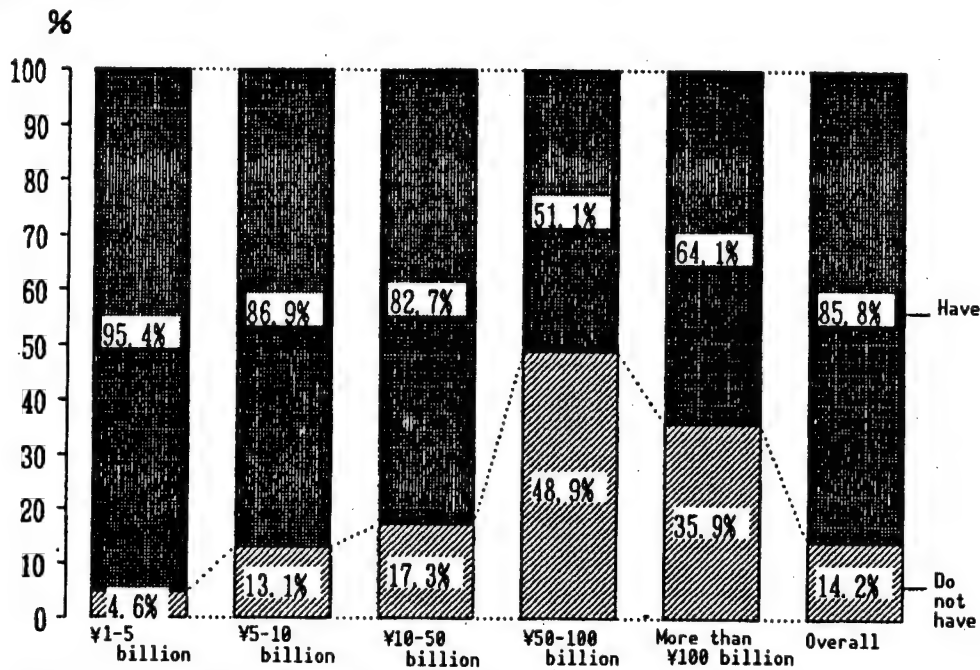


Figure 10. State of Ownership of Overseas R&D Strongpoints  
(By scale of capital)

**(2) When Overseas R&D Strongpoints Were Set Up and Why, When, Where, and for What Kinds of Reasons Did Private Firms Set Up Close to 300 Overseas R&D Strongpoints?**

We looked at the time periods during which the companies first set up overseas R&D strongpoints, by region. In the United States, 13 companies during the 1970s and 13 companies during the first half of the 1980s set up strongpoints, whereas after 1985, 75 companies did so. In Western Europe, too, it was six companies during the 1970s, three companies during the first half of the 1980s, and 43 companies after 1985. In the Asian NIEs, it was

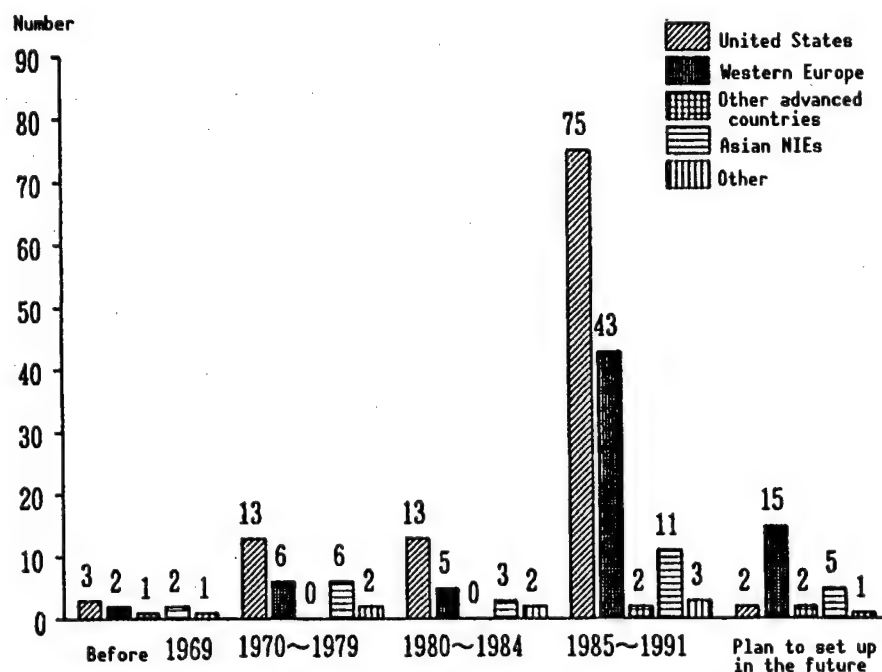
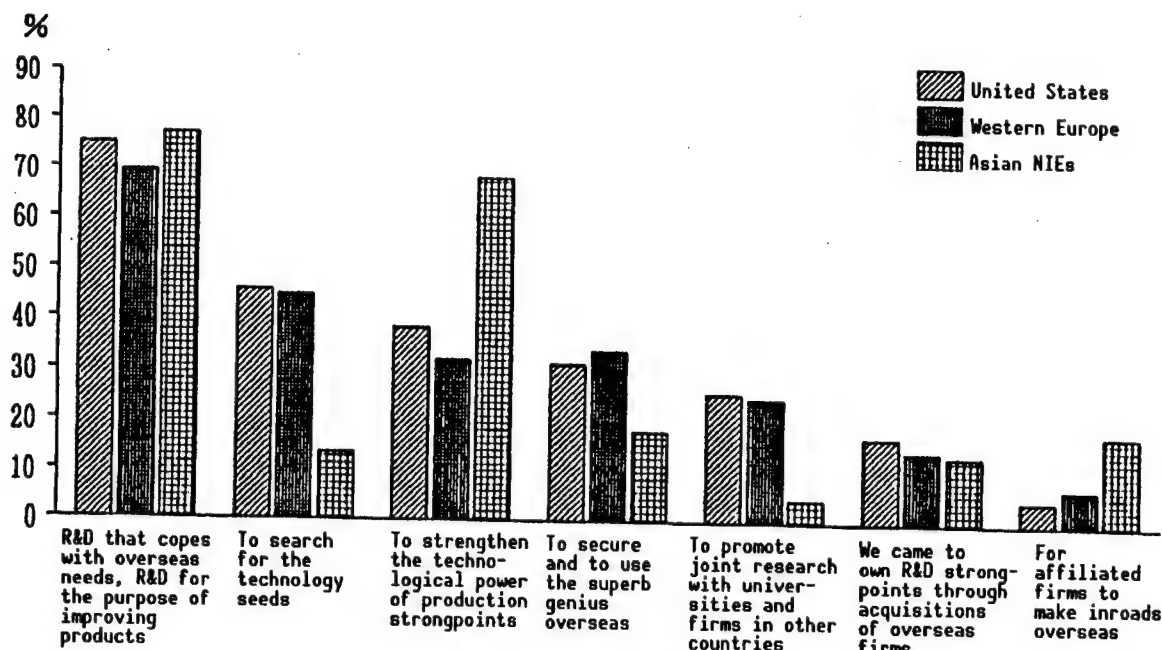


Figure 11. When First Overseas R&D Strongpoints Were Set Up (The values shown are total numbers of only the strongpoints that firms initially set up in the regions.)

six companies during the 1970s, three companies during the first half of the 1980s, and 11 companies after 1985. It is apparent that after 1985 there was a sudden increase in the number of R&D strongpoints set up in all of the regions (Figure 11). When we look at future plans to set up R&D strongpoints overseas, 15 companies plan to do so in Western Europe, where there will be a single EC market at the end of 1992, and five companies plan to do so in the Asian NIEs.

The most prevalent reason why private firms set up R&D strongpoints in any of the regions is for "R&D that copes with overseas needs, and the improvement of products." 75% of the firms that set up strongpoints in the United States gave this answer, as did 70% of those that set up in Western Europe and 77% in the Asian NIEs. This is seen as a way to cope with having to develop products that meet the demands of the area, and not just merely providing one type of product. The next most predominant reason for setting up strongpoints in Europe and United States was "to search for technology seeds"; 46% of the firms that set up in the United States and 45% of the firms in Europe gave this answer. As for the Asian NIEs, the second most often cited reason, given by 68% of the firms, was "to strengthen the technological power of production strongpoints" (Figure 12).



(Note: Based on multiple answers)

Figure 12. Reasons for Setting Up R&D Strongpoints Overseas

Looking at the characteristics of the major types of industries, 67% of the pharmaceuticals firms said that their main reason for setting up R&D strongpoints overseas was "to search for technology seeds." It is also noteworthy that the communications, electronics, and electrical measuring instruments industry cites as its prime reason "R&D that copes

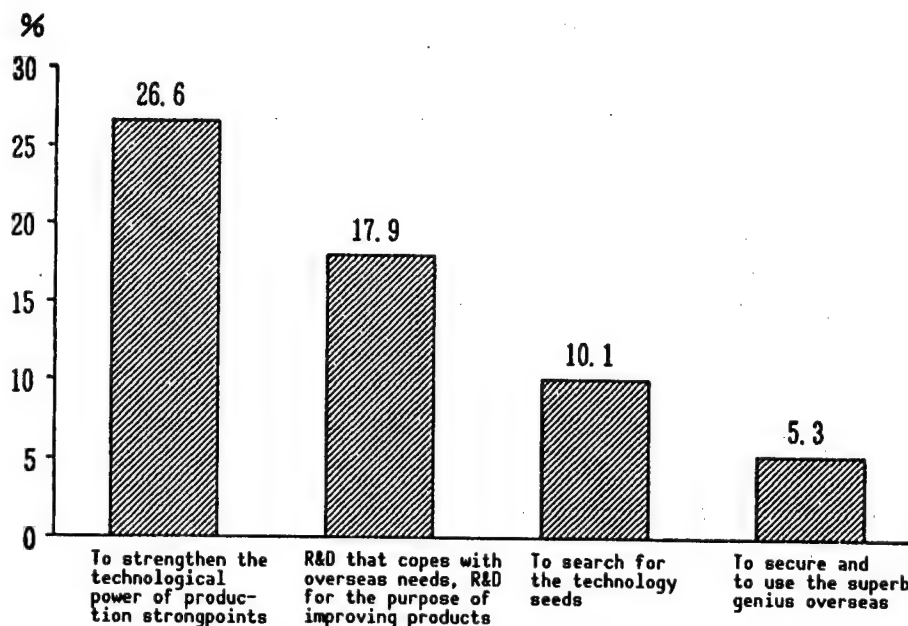


Figure 13. Percentages of Firms Saying That There Have Already Been Results From Setting Up Overseas R&D Strongpoints for the Reasons Given

with overseas needs, and the improvement of products" (United States, 67%; Western Europe, 75%).

When we asked whether or not there have already been results from setting up R&D strongpoints overseas for the reasons given, 27% of the firms whose reason was "to strengthen the technological power of production strongpoints" and 18% of those whose reason was "R&D that copes with overseas needs, and the improvement of products" said that there have been results. It appears that private firms do not often obtain the results at which they had originally aimed. And, only 10% of the firms whose reason was "to search for technology seeds" and 5% of those whose reason was "to secure and to use the superb genius [i.e., talented researchers and engineers] overseas" said that results had been obtained (Figure 13).

### (3) Research Management Problems at R&D Strongpoints Overseas

Although firms set up R&D strongpoints overseas, the reality of the situation is that results as originally aimed for have yet to be obtained. So, we asked about research management problems at the R&D strongpoints that firms set up overseas when the strongpoints were first set up, now, and in the future. We asked about the United States, Europe, and Asia separately. In the United States and Europe, where many strongpoints have been set up, the greatest problem in research management in the future will be "the efficient yield of R&D results." "Ensuring R&D personnel overseas" was a management problem at the time strongpoints were set up and will continue to be a problem in the future. In addition, "the treatment of intellectual property rights" is another problem that will increase from now on.

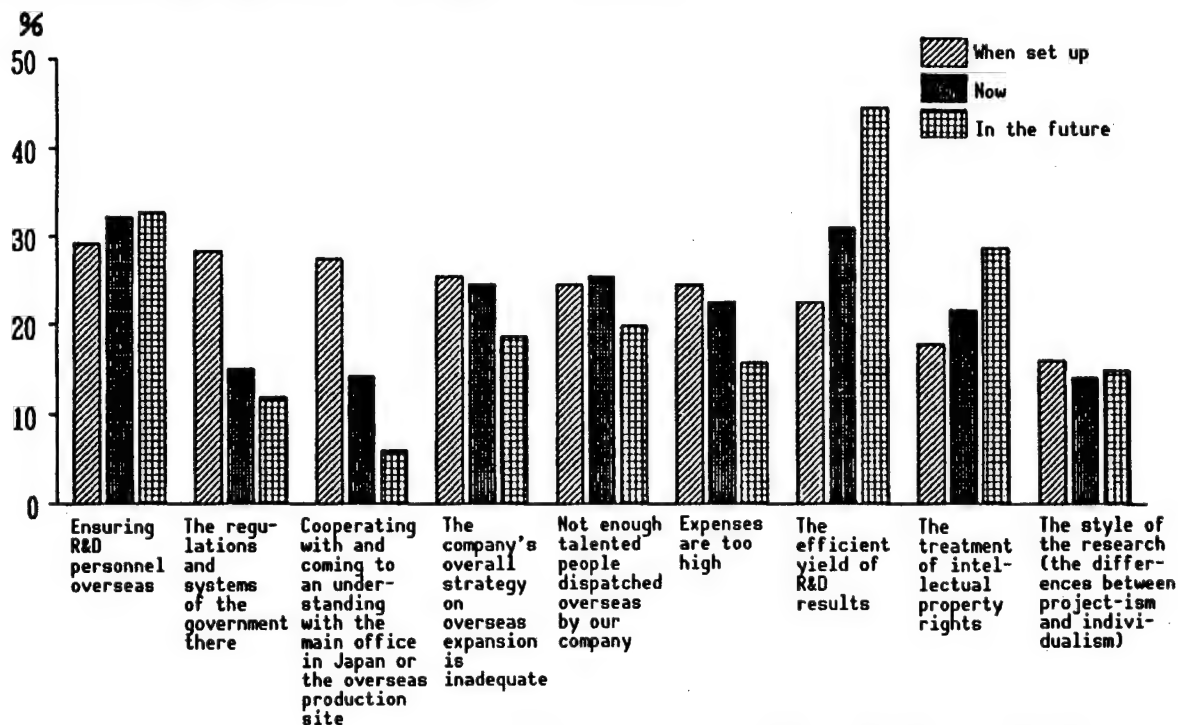


Figure 14. Research Management Problems at R&D Strongpoints Overseas (Europe and the United States)

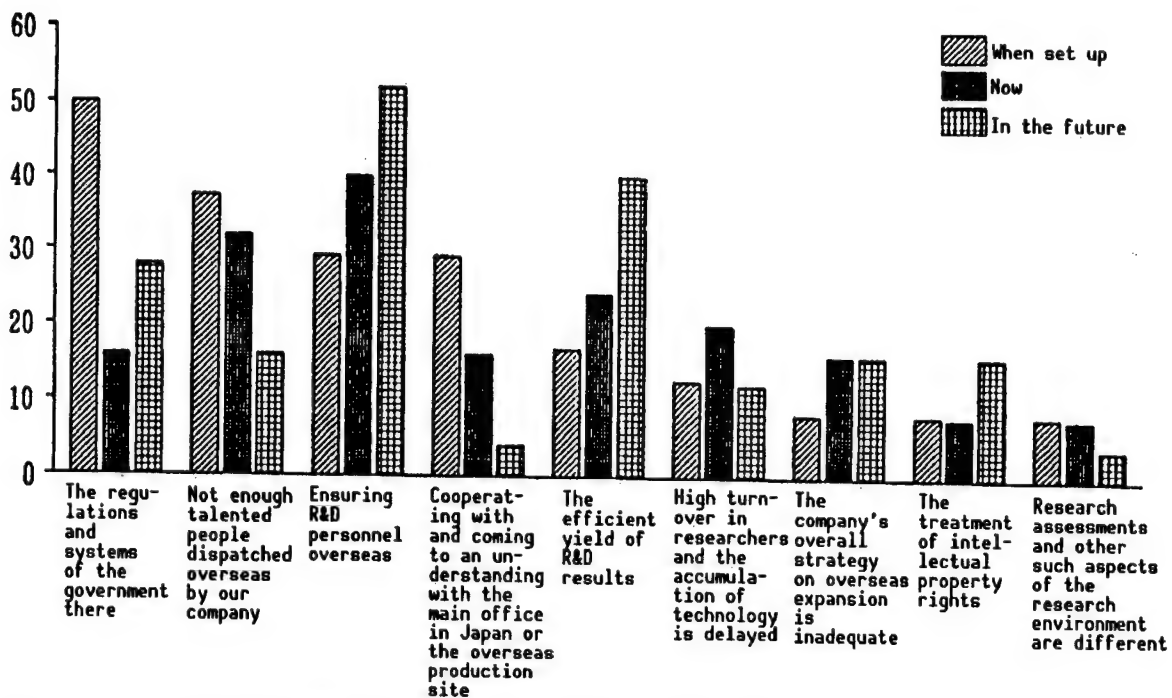


Figure 15. Research Management Problems at R&D Strongpoints Overseas (Asia)

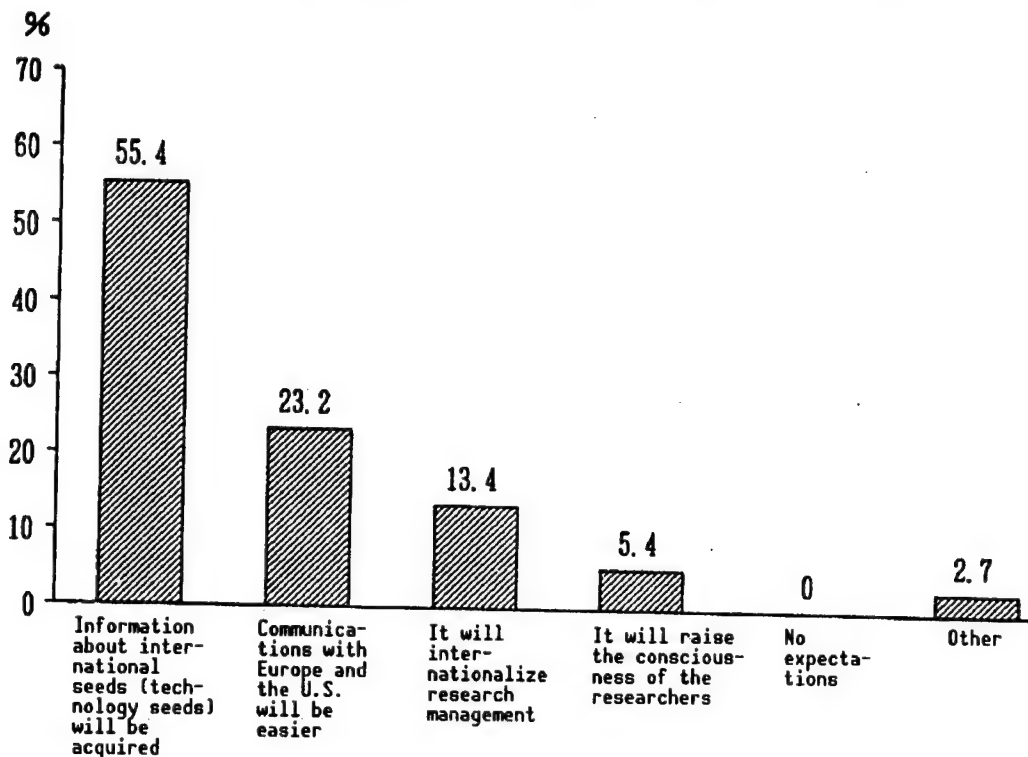


Figure 16. Expected Effects of Establishing European and U.S. R&D Strongpoints on Japanese R&D Strongpoints

As for Asia, "the regulations and systems of the government there" and "not enough talented people dispatched overseas by our company" were big problems at the time strongpoints were set up. Now and in the future, however, firms see those problems as being solved and instead there are more problems with "the efficient yield of R&D results" and "ensuring R&D personnel overseas (Figures 14 and 15).

#### **(4) Effects on Japanese R&D Strongpoints of Establishing European and U.S. R&D Strongpoints**

The primary objective of setting up R&D strongpoints in Europe and the United States, as explained before, was "R&D that copes with overseas needs, and the improvement of products." So, what kinds of effects on R&D strongpoints in Japan do firms expect that this establishment of R&D strongpoints in Europe and the United States will have? On this point, 55% of the firms answered that "information about international seeds (technology seeds) will be acquired," 23% said that "communications with Europe and the United States will be easier," and 13% said that "it will internationalize research management" (Figure 16). It appears that the tendency to rely on other countries for uncovering seeds continues.

#### **(5) Content of Research at R&D Strongpoints Overseas**

We asked about the content of the research that is now being done and that which is planned for five years later at R&D strongpoints overseas.

As for the research that is now being done, 75% of the firms answered that it involves "the development of products that correspond to the market in the area," 24% said "research for the purpose of improving productivity," 23% said "the development of what will become core technologies," and 15% said "research to clear the regulations there." Naturally, much of the research corresponds to the reasons given for setting up R&D strongpoints overseas: "R&D that copes with overseas needs and R&D for the purpose of improving products" and "to strengthen the technological power of production strongpoints."

As for five years from now, 73% of the firms answered "the development of products that correspond to the market in the area," which is no change. However, 46% said that the content of their research five years from now will be "the development of what will become core technologies," which is double the number that are doing such research now (Figure 17).

By type of industry, a high percentage of pharmaceuticals firms (33%) and electrical machinery and appliance firms (32%) are now doing basic research. We know that these types of industries place a great deal of importance on basic research overseas. The types of industries that will significantly increase "the development of what will become core technologies" in five years are the communications, electronics, and electrical measuring instruments industry (75%) and the precision machinery industry (63%), which are the types of industries in which Japan is technologically strong. Many of these kinds of firms are expanding their production strongpoints overseas, so we can view

this as an indication of their strategy to develop in the countries where their production strongpoints are located that which will become the core technologies for the development of needed products.

#### (6) Number of Researchers and Their Nationalities at R&D Strongpoints Overseas

Five years ago, the total number of researchers per company that were employed at R&D strongpoints overseas was small in scale: more than half of the companies, 24 of them, said that they had "1-4 people." In contrast, most of the companies, 27 in all, now have "20-49 people" em-

ployed at R&D strongpoints overseas. The number of researchers is steadily increasing; it is higher now than five years ago, and it will be higher five years from now (Figure 18). And, after five years the number of researchers will increase even more—there will be six companies with 500 or more researchers. There

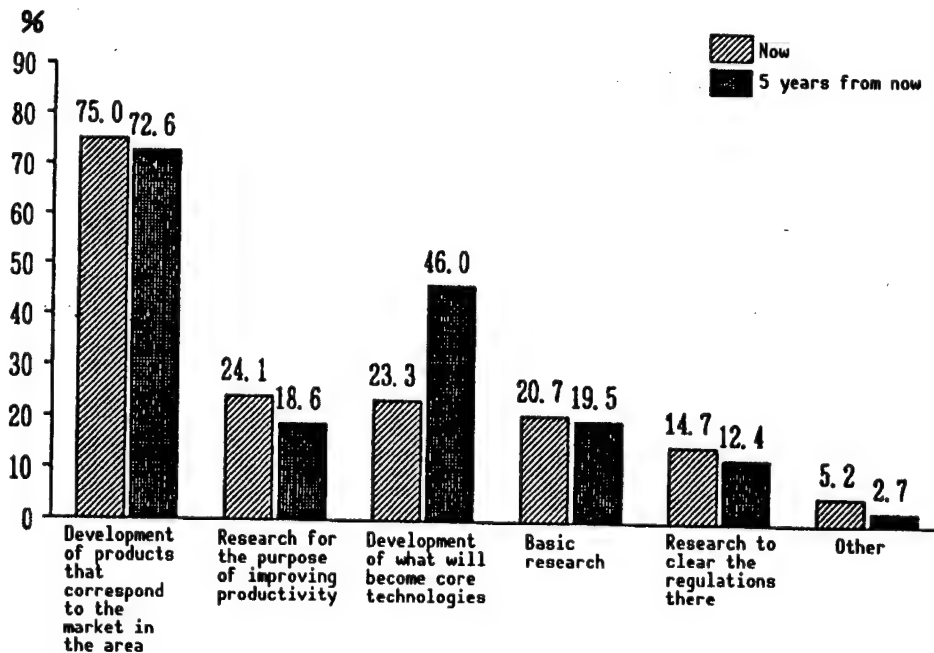


Figure 17. Content of Research at R&D Strongpoints Overseas

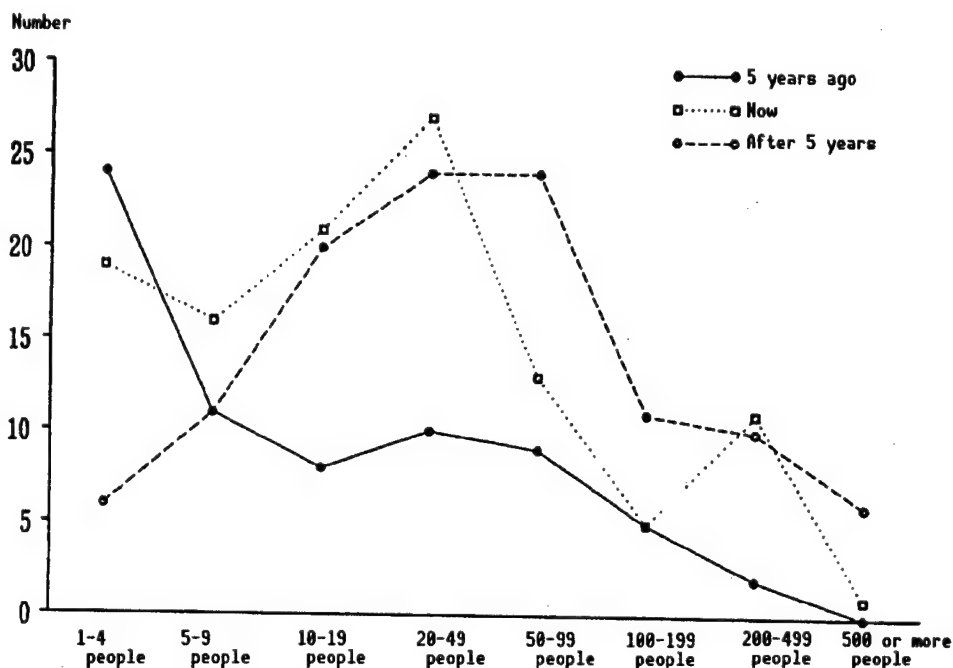


Figure 18. Number of Researchers at R&D Strongpoints Overseas



were three automobile companies, two electrical machinery and appliance companies, and one chemical company that answered that they will have 500 or more researchers at their R&D strongpoints overseas.

As for the nationalities of the researchers, the responses of "mainly non-Japanese" and "mainly Japanese" were about the same for five years ago. Now, however, with about 70% of the responses "mainly non-Japanese," we know that the R&D strongpoints of private firms are primarily run by non-Japanese researchers. There were even more firms that said that it will be "mainly non-Japanese" five years from now, and less than 10% said "mainly Japanese" (Figure 19).

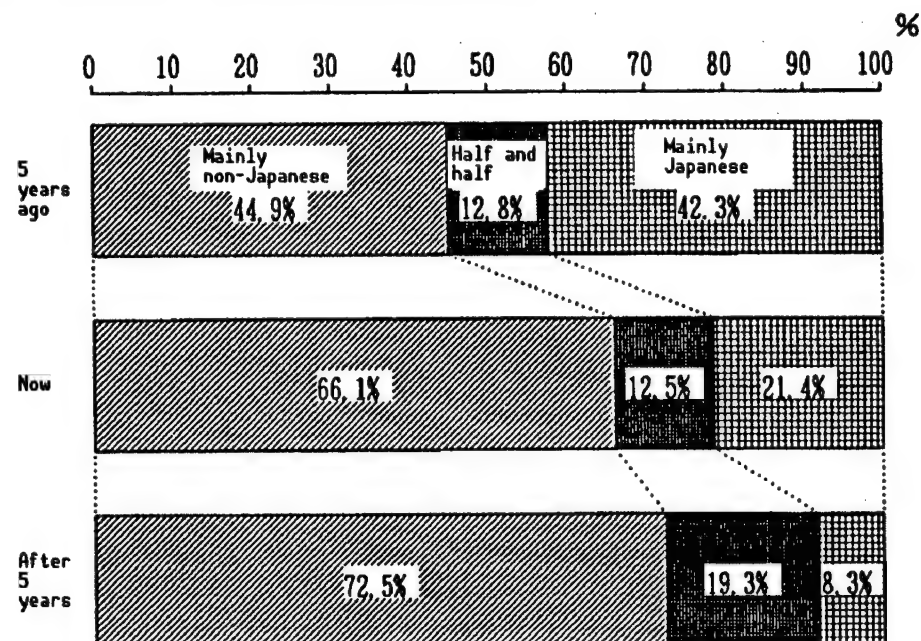


Figure 19. Nationalities of Researchers at R&D Strongpoints Overseas

The forecast is that as research strongpoints grow larger in scale, the percentage of Japanese researchers will decrease.

#### (7) Joint Research at Overseas R&D Strongpoints

The R&D strongpoints that have been set up overseas provide a critical foothold for the private firms of Japan to conduct joint research with the universities, firms, and government research institutes of foreign countries. The number of joint research efforts of overseas R&D strongpoints with universities, firms, and government research institutes of foreign countries was 73 five years ago, but, as the number of R&D strongpoints overseas increases, joint research efforts will increase to 2.9 times the current 214 projects. Japanese firms appear to be actively taking part in joint research.

#### (8) Why Some Japanese Firms Do Not Establish R&D Strongpoints Overseas

When we asked the firms that have not set up R&D strongpoints overseas (698 companies) why they have not done so, 52% answered that their "R&D strongpoints in Japan are sufficient, and there is no need to establish any overseas," and 27% said that they "cannot afford to set up strongpoints overseas" (Figure 20).



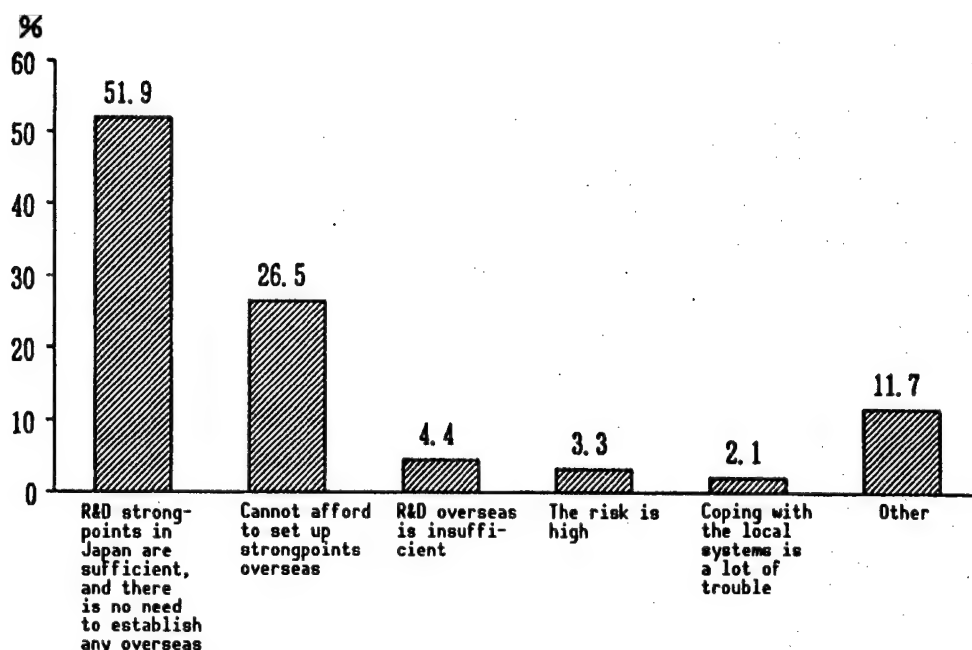


Figure 20. Why Some Japanese Firms Do Not Establish R&D Strongpoints Overseas

By type of industry, many domestic-demand-type firms, e.g., 76% of those in the pulp and paper industry and 73% of construction firms, answered that their "R&D strongpoints in Japan are sufficient, and there is no need to establish any overseas." Conversely, the types of firms that replied that they "cannot afford to set up strongpoints overseas," even though do not think that the R&D strongpoints in Japan are adequate, included 43% of the pharmaceuticals firms and 42% of the synthetic chemicals firms.

When we looked at this by scale of capital, a trend was seen in that the smaller the scale of capital, the more firms there were that answered that they "cannot afford to set up strongpoints overseas." A large difference is apparent: 27% of the firms with less than ¥50 billion in capital gave this response, but only 17% of the firms with more than ¥50 billion said so. This supports the fact that there was a higher percentage of firms with large amounts of capital that have R&D strongpoints overseas.

#### (9) Technology Trade Results

Technology trade, in which technology such as patents, know-how, and technical guidance are supplied to or received from foreign countries, is an important index of international technical exchange. When we asked firms if they engaged in technology trade, 36% answered that it was "both technology trade imports and exports," 13% said "only technology trade exports," 15% said "only technology trade imports," and 36% said "no technology trade" (Figure 21). When we asked those firms that export technology whether or not their trading partners were subsidiaries, 43% replied that their technology trade was with "subsidiaries only," and 27% said "mostly subsidiaries." Taken together these

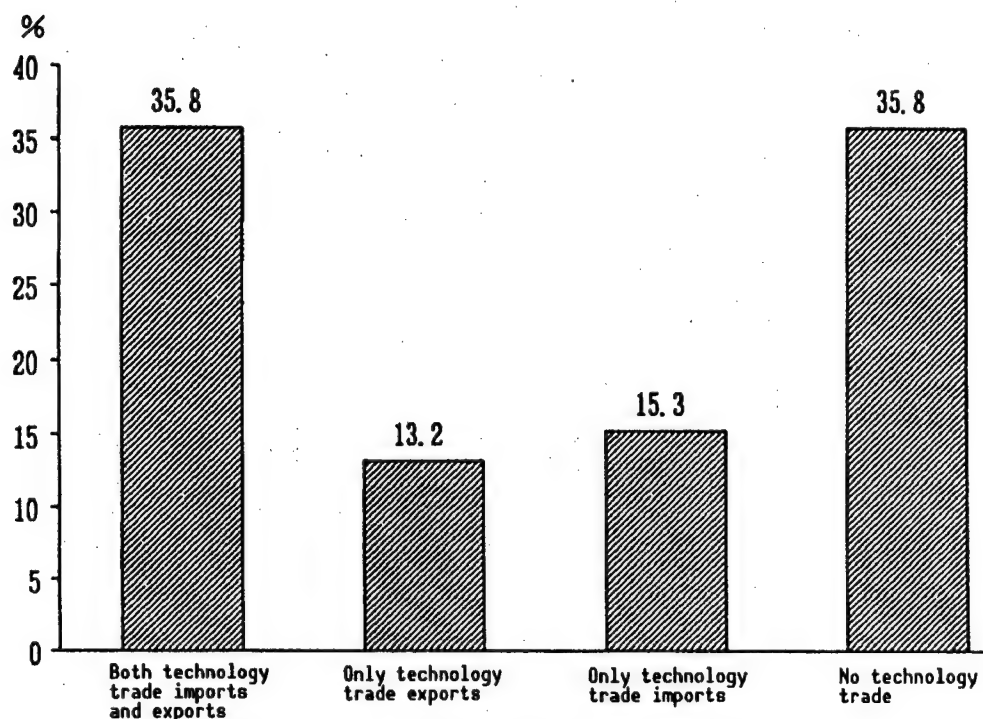


Figure 21. Technology Trade Results

account for about 70% of the responses, indicating that technology trade is carried out widely regardless of whether or not there is a capital relationship (Figure 22).

By type of industry, many domestic-demand-type firms had no technology trade results, e.g., transportation, communications, and public utilities (77% of which had no technology trade); the construction industry (64%); the pulp and paper industry (58%). In response to the previous question about the comparison of the R&D strength of Japan, Europe, and the United States, these types of industries gave the most responses that now "Japan = United States = Europe." This indicates that there is little difference in R&D strength and that it is not easy for technology trade to be carried out by these domestic-demand-type industries, perhaps because they do not have many interdependent relationships internationally.

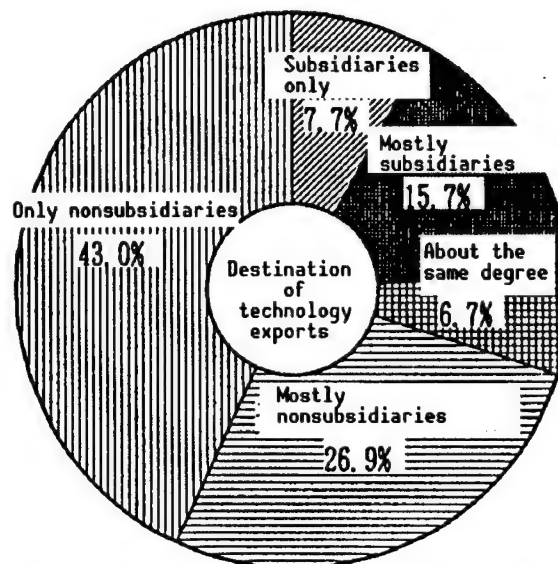


Figure 22. Proportions of Technology Export Destinations

#### (10) Relative Importance of Asian NIEs in R&D Strategy

The viewpoint that the Asian NIEs will not become competitive partners with respect to technological strength for a long while has become more prevalent. So, as what sort of strongpoints are the Asian NIEs regarded in R&D strategies, and what is their relative importance? On this point, we know that firms see the Asian NIEs as product development strongpoints: 71% of the firms replied that the NIEs are "not important as R&D strongpoints," and 30% said that they are important as "product development strongpoints (including production support)" (Figure 23).

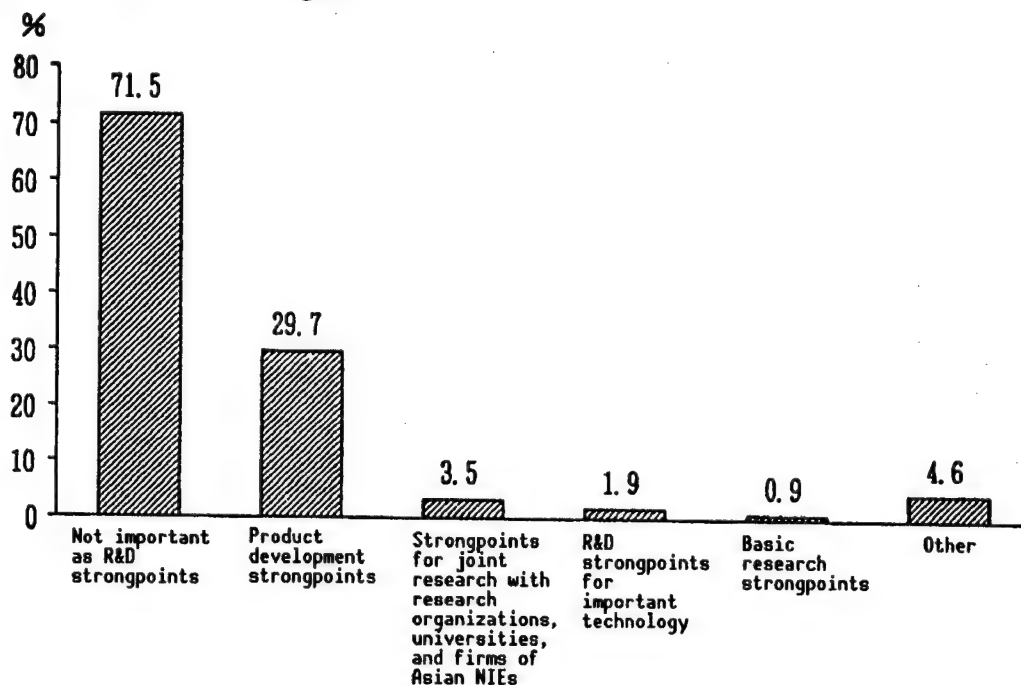


Figure 23. Relative Importance of Asian NIEs

#### (11) Contributions Made, Research Commissioned to Universities Overseas and in Japan

The relationship between firms and universities is very important for R&D activities, and, in the search for new knowledge, joint research and commissioned research is being carried out with vigor. In recent years, relationships with universities overseas, and not just Japanese universities, have become lively. So, in order to look at the flow of funds from firms to universities, we investigated overseas universities and Japanese universities separately with respect to the total amounts of endowments and commissioned research expenditures. The result was that 76% of the firms (497 companies) said that they have given "nothing at all" for endowments and commissioned research at overseas universities, whereas only 24% (185 companies) said that they give "nothing at all" to Japanese universities. And, with respect to all the different amount categories, there were many more firms that gave to Japanese universities than to overseas universities. In the totals for all the firms, clearly that for Japanese universities is a great deal higher than that for overseas universities (Figure 24).

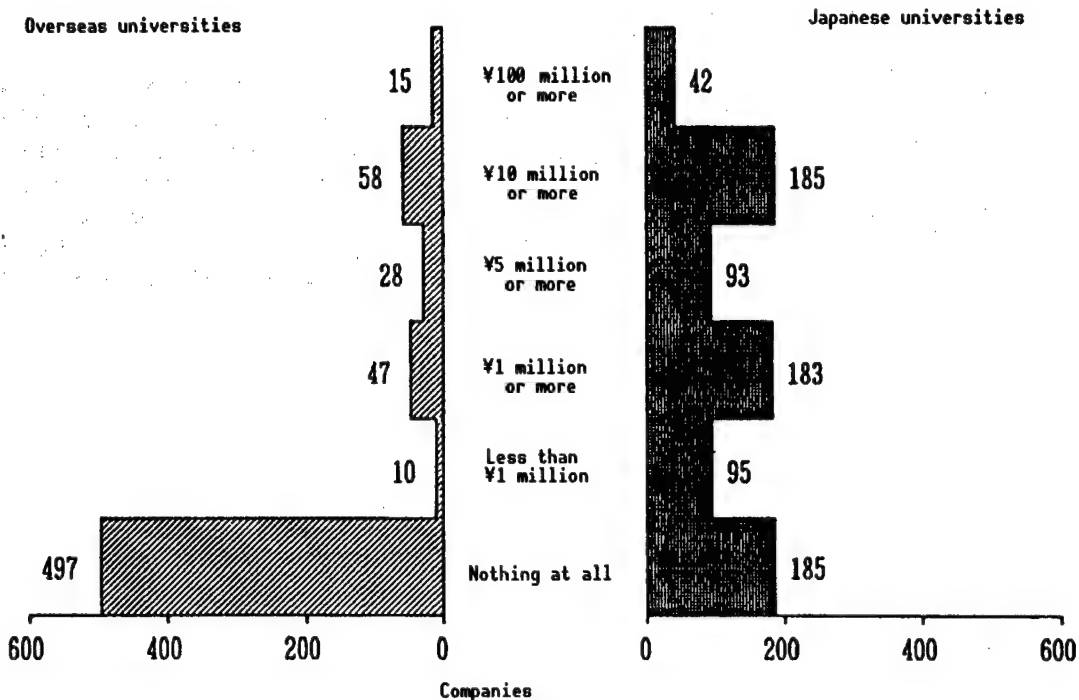


Figure 24. Contributions Made, Research Commissioned to Universities Overseas and in Europe

By scale of capital there clearly appears to be a trend where the larger the scale of the firm, the more money is given to universities, whether they are in Japan or overseas.

When we looked at the ratio of the number of firms that contributed to and commissioned research to overseas universities and the number of firms that gave to Japanese universities according to the amount of the contributions and commissioned research expenditures, the larger the amount, the higher the ratio is of the number of firms that gave to universities overseas (Figure 25).

Although the number of such responses was small (24 companies), there were some firms that gave more in contributions and commissioned research expenditures to overseas universities than to Japanese universities. When we asked them why, 29% answered that "overseas universities are at a higher level," and 26% said "because Japanese universities are not accustomed to industry-university cooperation" (Figure 26).

#### (12) Ultimate Image of International Expansion of R&D

As is clear from the survey results thus far, Japan's private firms are actively expanding their R&D internationally by setting up R&D strongpoints overseas, exchanging technology with universities and firms overseas, and so forth. How do these firms regard the ultimate image of their international R&D expansion? When we asked them about that ultimate image, including whether or

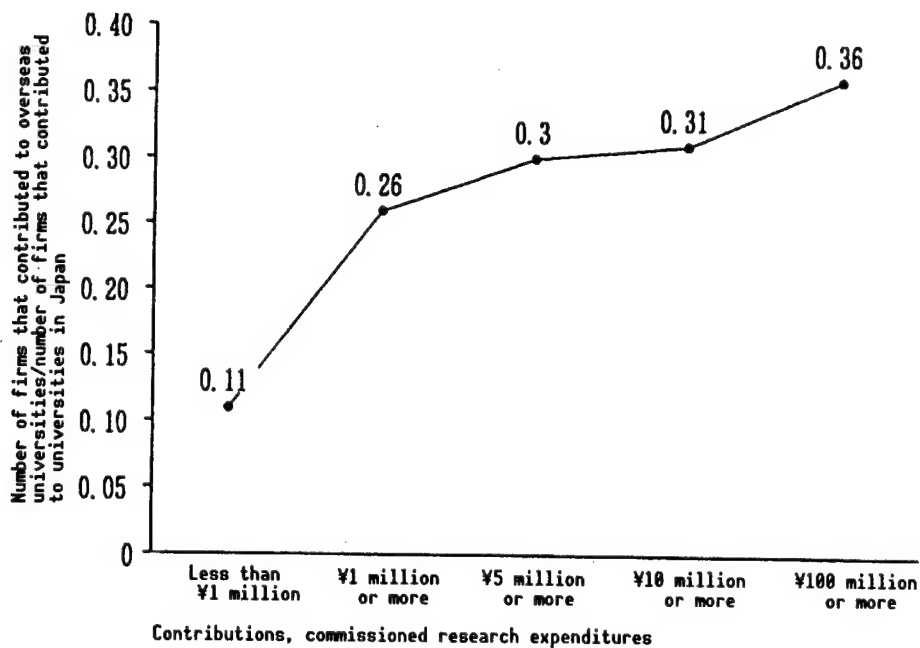
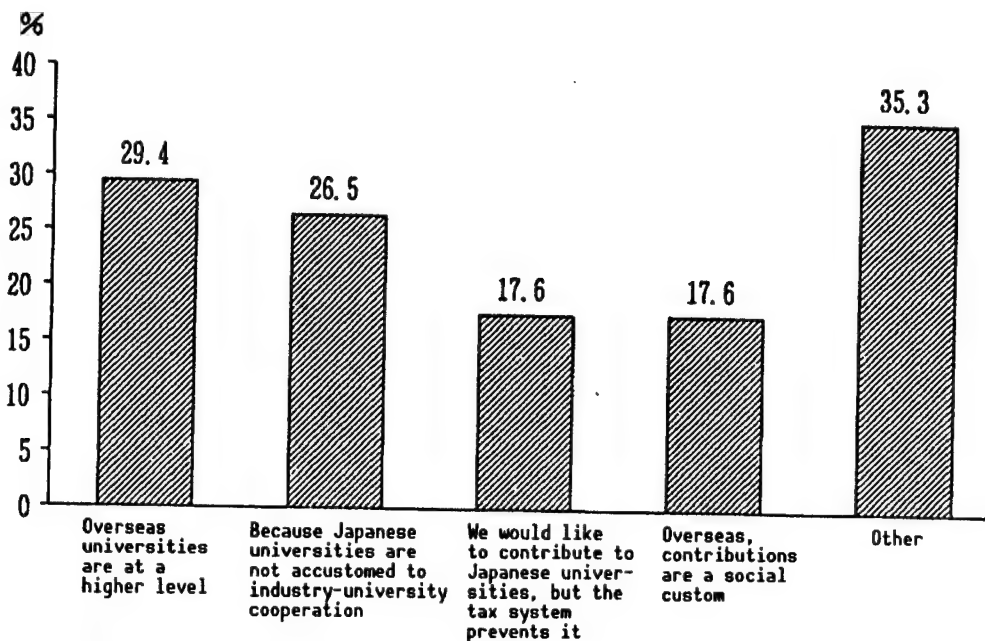


Figure 25. Ratio of Number of Firms That Contributed To and Commissioned Overseas and Japanese Universities



(Note: Based on multiple answers)

Figure 26. Why Firms Contribute More and Commission More Research to Overseas Universities Than to Japanese Universities

not they have plans for international expansion of their R&D, only 34% answered that they "do not intend to internationally expand R&D." Of the more than 60% of all the firms that do have an ultimate image of international expansion, 24%, which was the most, said that they "have the core R&D

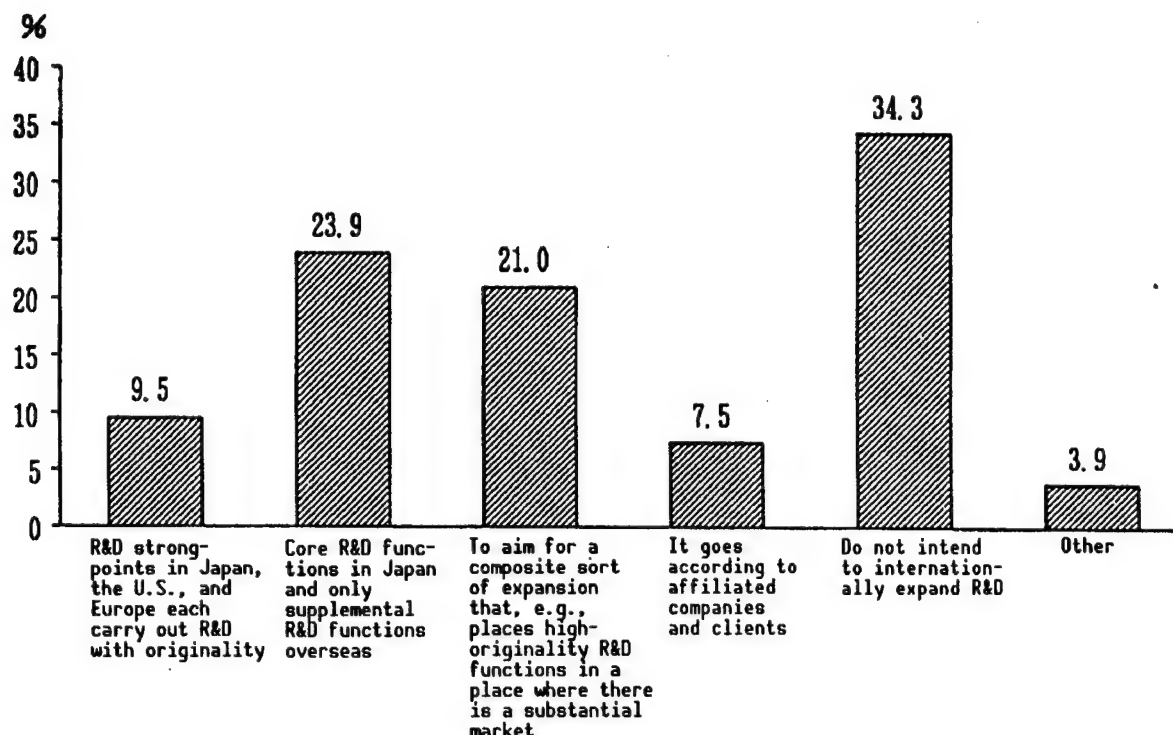


Figure 27. Ultimate Image of International Expansion of R&D

functions in Japan, and overseas only set up supplemental R&D functions." On the other hand, 21% said that they "aim for a composite sort of expansion that, for example, places high-originality R&D functions in a places where there is a substantial market." R&D that has originality is seen as increasing in the future: 10% of the firms replied that their "R&D strongpoints in Japan, the United States, and Europe each carry out R&D with originality." Then 8% answered that "it goes according to affiliated companies and clients" (Figure 27).

### 3. State of Globalization of R&D Strongpoints in Japan

#### (1) Numbers of Non-Japanese Researchers

Although there have been considerably more non-Japanese researchers than Japanese researchers at the overseas R&D strongpoints of Japanese firms, non-Japanese researchers employed in Japanese firms inside Japan are still few in number.

We asked about the numbers of non-Japanese researchers inside Japan, by their nationalities, three years ago and now. The total number three years ago was 219; that number is now 751, which is a sudden increase of 3.4-fold in the past three years. By nationality, three years ago there were 87 Asians, 74 Americans, 48 West Europeans, and 10 people from other countries; there were about the same number of researchers from Asia as the United States Now, there are 397 Asians, 189 Americans, 125 West Europeans, and 40 researchers from

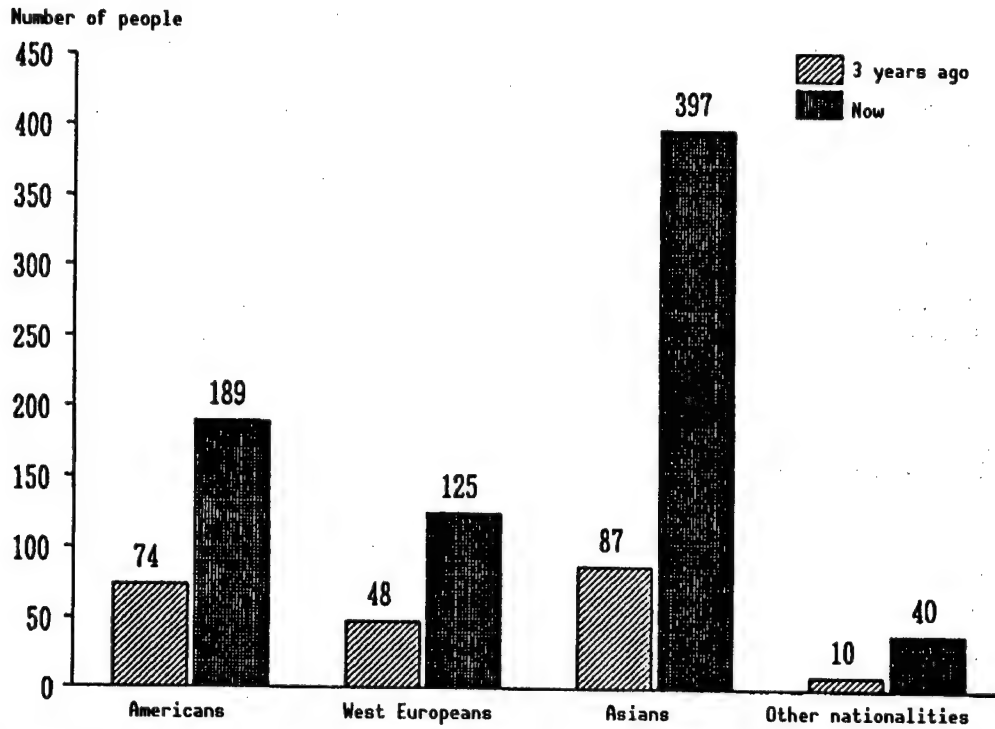


Figure 28. Numbers of Non-Japanese Researchers at R&D Strongpoints in Japan, by Nationality

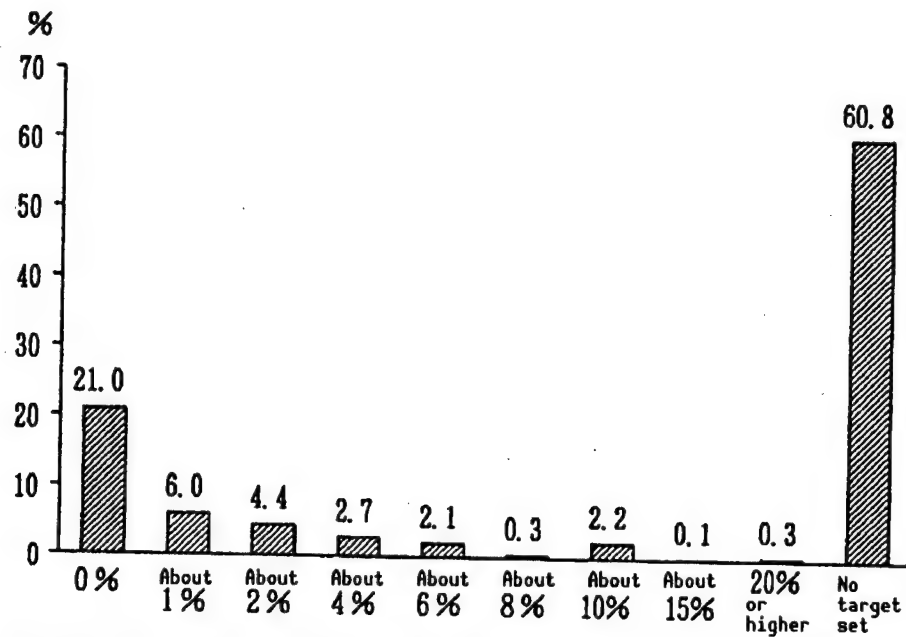


Figure 29. Future Target Percentages of Non-Japanese Researchers at R&D Strongpoints in Japan

other countries. The numbers for all of the nationalities are increasing, but the increase in the number of researchers from Asia is especially growing (Figure 28). The reason why there are so many Asian researchers is thought to be because there have been more opportunities for Asian university students in Japan to stay in Japan and work for Japanese firms after they graduate.

We asked about future targets for the percentages of non-Japanese researchers at R&D strongpoints inside Japan. Most firms, 61% of them, answered that they have not set any targets; 21% of the firms said "0%" but 6% of the firms said "about 1%" and 4% of the firms said "about 2%." There were also 20 companies that said that their target is 10% or higher. This is thought to largely reflect the differences in strategies among firms (Figure 29).

## (2) Acceptance of Trainees and Researchers Sent Because of Mutual Dispatching, Dispatching Researchers to Foreign Countries

Accepting talented people from foreign countries and sending people to foreign countries are effective means of international technical exchange. Firms now have accepted 538 foreign researchers as trainees and 75 foreign researchers as a part of mutual dispatching. In contrast, the number of Japanese

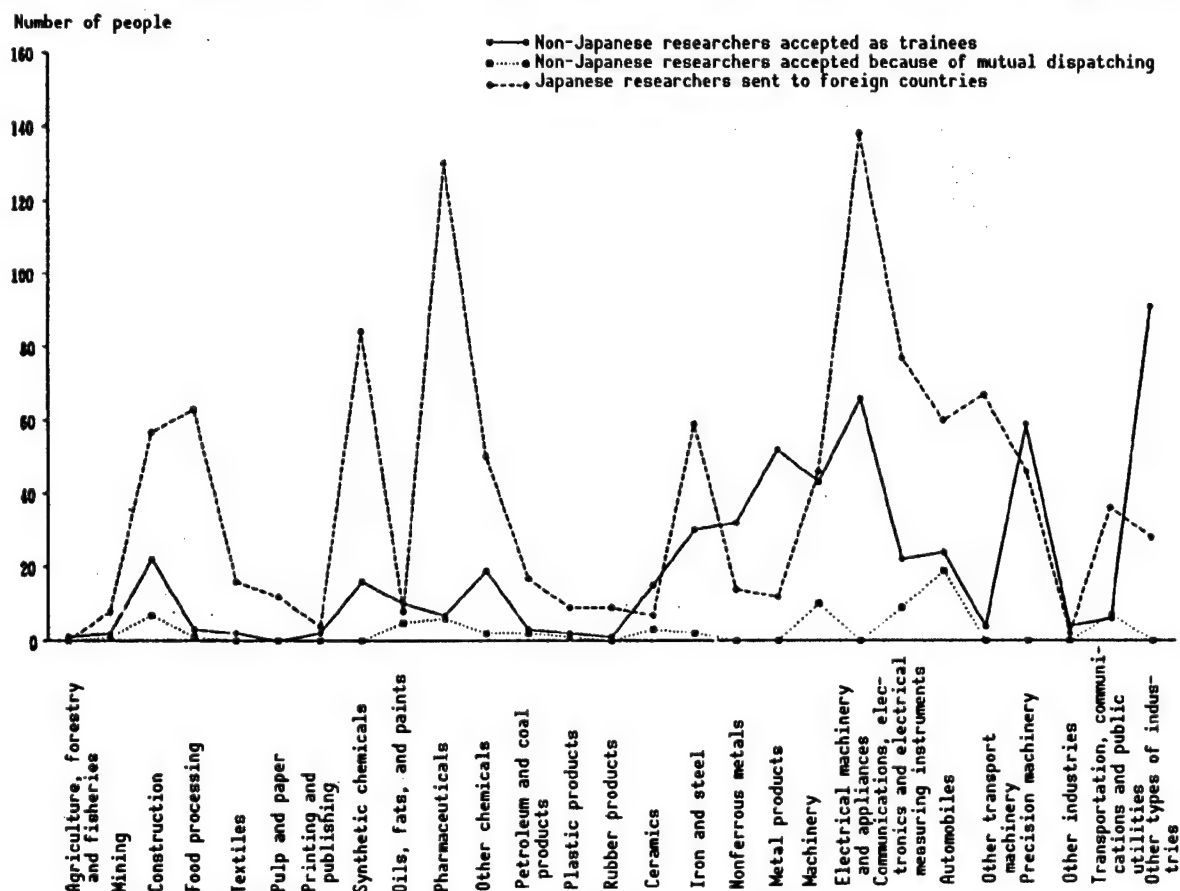


Figure 30. Numbers of People Sent and Received, by Type of Industry

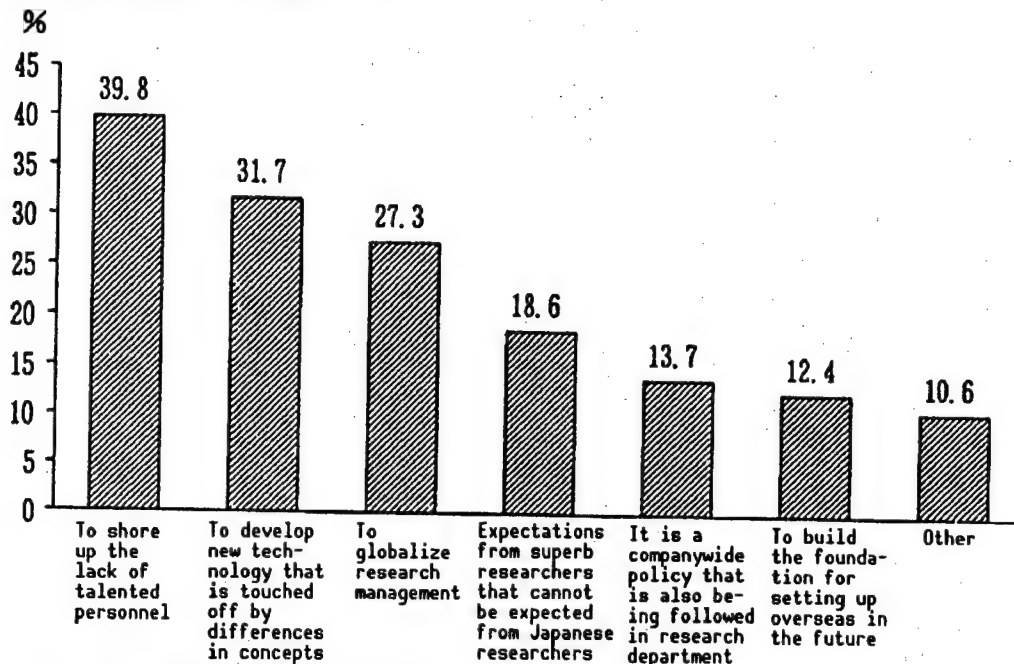


researchers dispatched by firms to foreign countries stands at 1,059. With the ratio of the number of people sent abroad to the number accepted in Japan at two to one, we should require firms to put more effort into accepting foreign researchers.

By type of industry, the most foreign researchers are accepted as trainees by electrical machinery and appliance firms, precision machinery firms, and metal products firms. The most foreign researchers are accepted as a result of mutual dispatching by automobile firms and machinery firms. The most Japanese researchers are sent to foreign countries by electrical machinery and appliance firms, pharmaceuticals firms, and synthetic chemicals firms (Figure 30).

### (3) Employment of Non-Japanese Researchers

As discussed previously, there has been a rapid increase in the number of non-Japanese researchers employed in Japanese firms within Japan. Furthermore, there are more than a few firms that have set targets of 10% or more for the percentage of non-Japanese researchers they will employ in the future. When we asked firms that employ non-Japanese researchers at their R&D strongpoints in Japan what their reasons are for doing so, a surprisingly small number, 32%, answered "for the development of new technology that is touched off by differences in concepts," a response that is generally assumed. The effects of the shortage of researchers are also apparent: most firms, 40% of them, responded that they employ non-Japanese researchers to "shore up the lack of talented personnel" (Figure 31).



(Note: Based on multiple responses)

Figure 31. Reasons for Employing Non-Japanese Researchers

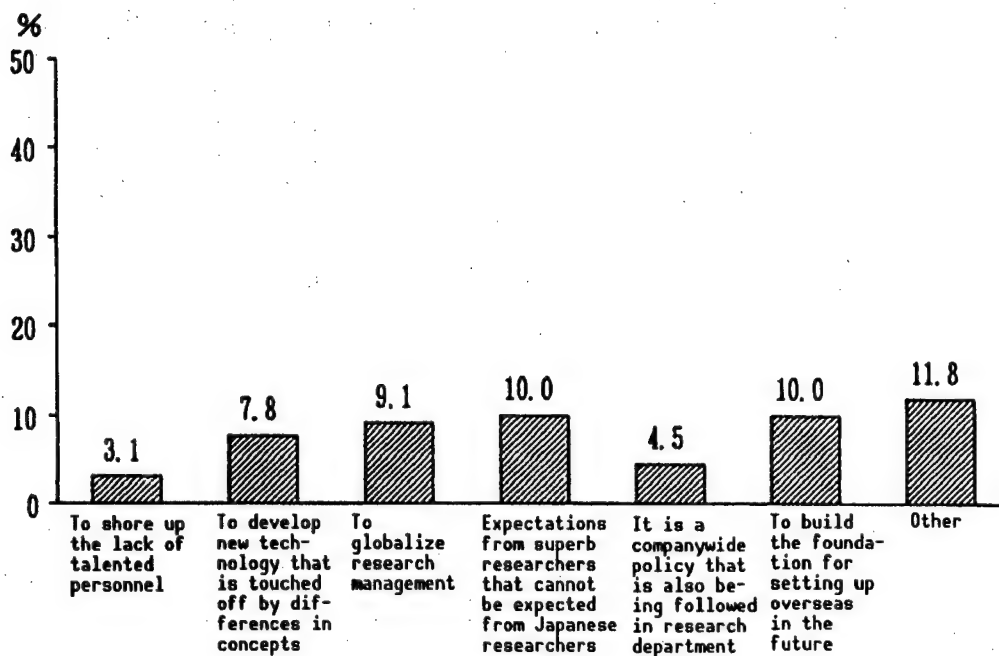


Figure 32. Percentage of Firms That Already Saw Results From Employing Non-Japanese Researchers for Reasons Given

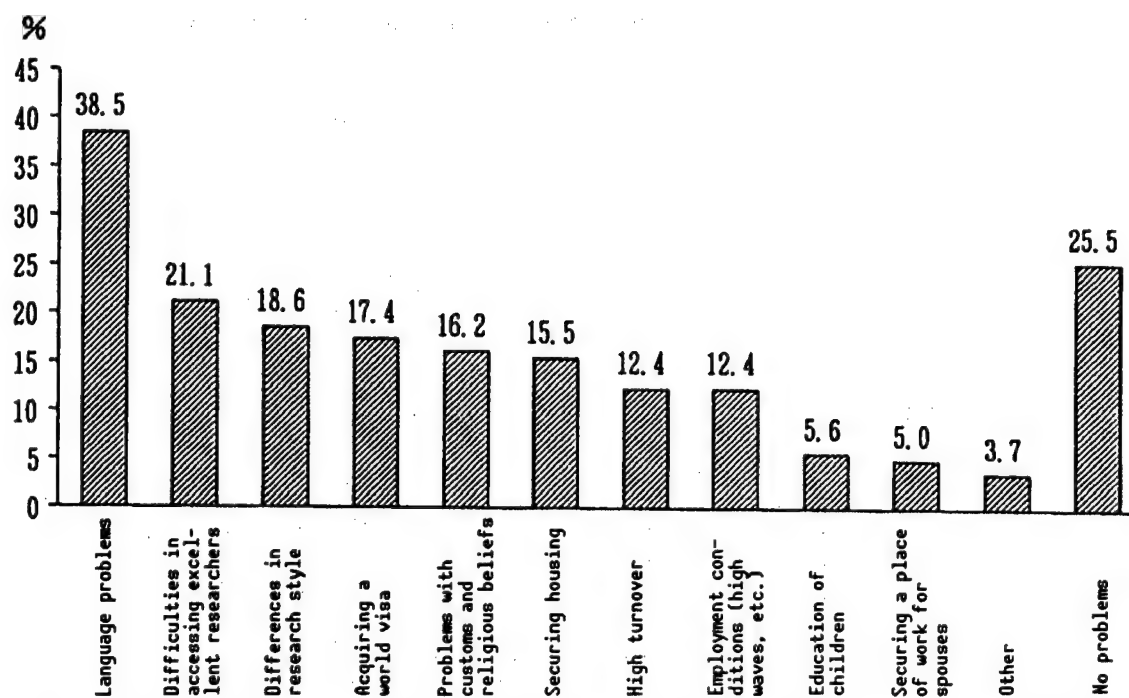


Figure 33. Problems Encountered in Employing Non-Japanese Researchers

We also asked whether or not there have already been results from employing non-Japanese researchers for these reasons, and it seems that hardly any results have been seen yet (Figure 32).

When we asked about the problems encountered when employing non-Japanese researchers, 25% of the firms answered that "there are no problems." The biggest difficulty is with "language problems," which 39% of the firms cited. Then 21% of the firms said that they had "difficulties in accessing excellent researchers," and 19% said that "differences in research style" are a problem. Except for language problems, considerable progress is expected to be made in the employment of non-Japanese researchers by firms (Figure 33).

#### (4) Joint Research of R&D Strongpoints in Japan with Organizations Overseas

It has been shown that the relationships of the overseas R&D strongpoints of firms with the universities, firms, and government research institutes of foreign countries have become very energetic, but when we asked about the extent to which R&D strongpoints inside Japan do joint research with the universities, firms, and government research institutes of foreign countries, we found that five years ago there were 967 such joint efforts. Now that number is 1,773—in five years, a 1.8-fold increase. Joint research with research organizations overseas is becoming more vigorous, both at overseas strongpoints and at strongpoints in Japan.

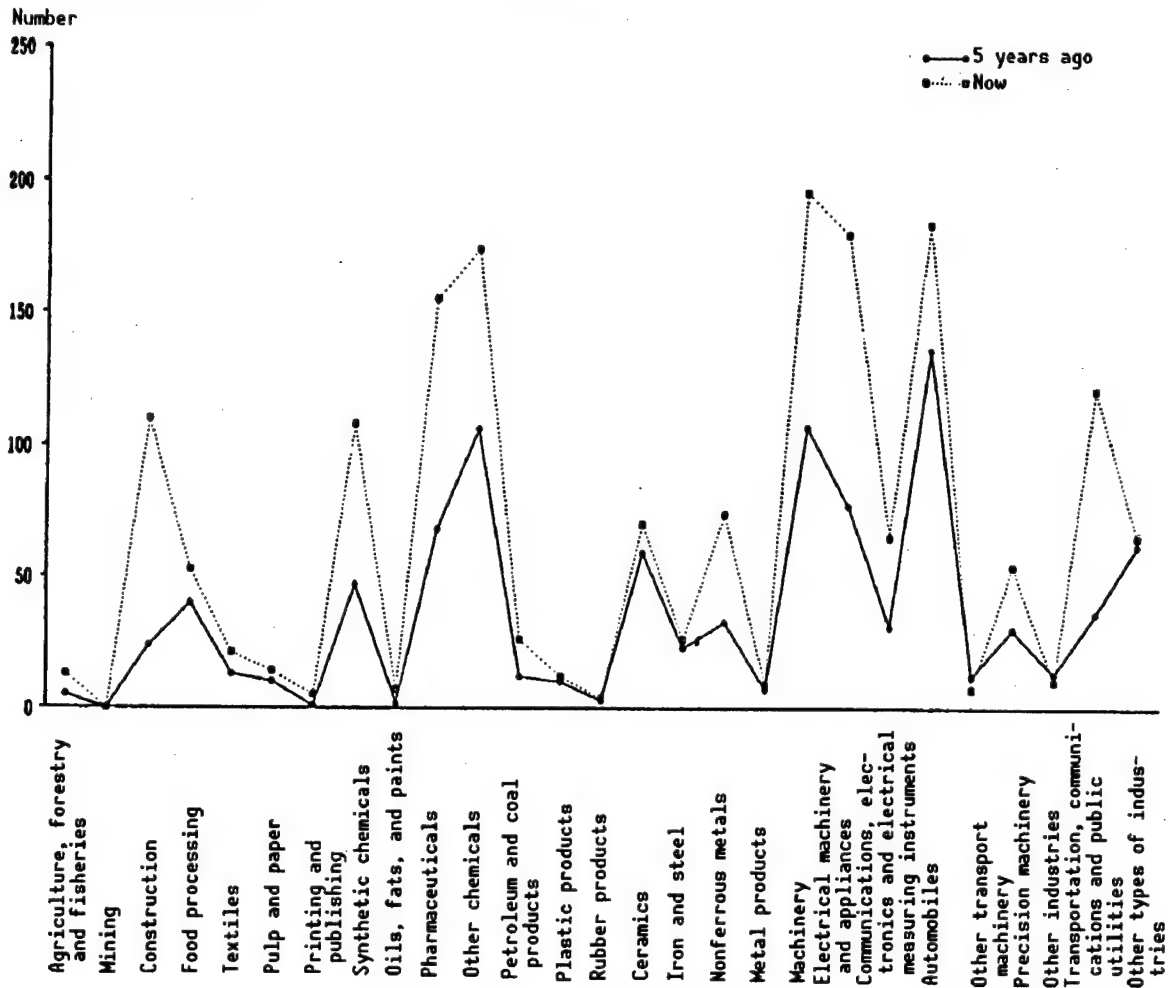
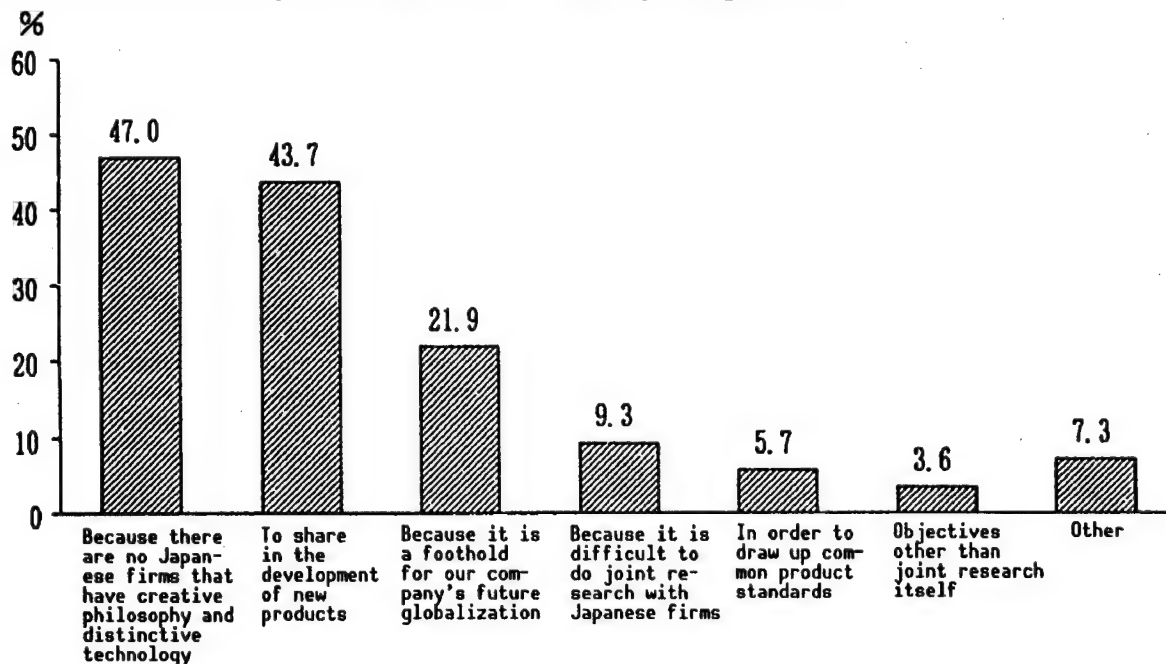


Figure 34. Number of Joint Research Efforts, by Type of Industry

Most of the different types of industries are now doing more joint research with overseas organizations than they did five years ago. The largest numbers of joint efforts are by the machinery industry, automobile industry, and electrical machinery and appliance industry (Figure 34).



(Note: Based on multiple responses)

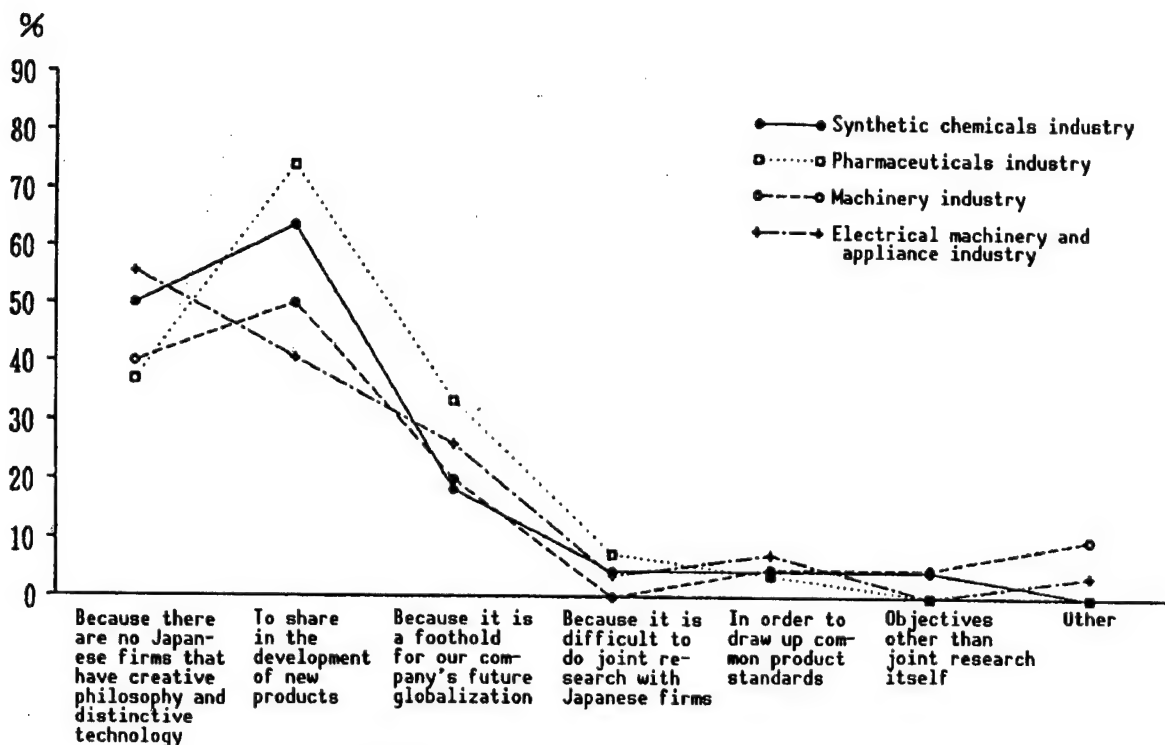
Figure 35. Why R&D Strongpoints in Japan Carry Out Joint Research With Overseas Firms

When we asked the 247 companies that are carrying out joint research with overseas firms, their reasons for doing so, 47% answered that it is "because there are no Japanese firms that have creative philosophy and distinctive technology," 44% said "to share in the development of new products," and 22% said "because it is a foothold for our company's future globalization" (Figure 35). We gather that the idea among firms that creative philosophy and distinctive technology comes from overseas still remains strong.

By type of industry, many electrical machinery and appliance firms answered that they carry out joint research with overseas firms "because there are no Japanese firms that have creative philosophy and distinctive technology," while many pharmaceuticals firms and synthetic chemicals firms said "to share in the development of new products" (Figure 36).

#### (5) Setting Up Open Basic Research Laboratories in Japan

Overseas there are several examples of private firms operating laboratories such as Bell Labs that carry out very leading-edge research with a broad-minded outlook towards accepting outside researchers. The laboratories have played a leading role in the history of S&T. When we asked the firms what they think about setting up such a laboratory in Japan, 79% answered that "although we recognize the need for such a laboratory, our company does not think about



(Note: Based on multiple responses)

Figure 36. Reasons for Doing Joint Research, by Type of Industry

setting one up," 1% (7 companies) said "that kind of laboratory (department) is necessary, and we are already setting one up," and 1% (8 companies) said "that kind of laboratory (department) is necessary, and we are planning to set one up." In contrast, 9% answered that "bringing such a laboratory into existence in Japan's research climate would be difficult," and 3% said "even from a worldwide view, firms do not need such laboratories." Although there was a small number of firms with a negative view on this and most of them think that such laboratories are necessary, setting up such a laboratory is not thought to be possible in reality because of reasons such as the costs involved (Figure 37). Even in this survey, there was not one firm with less than ¥10 billion in capital that said "that kind of laboratory (department) is necessary, and we are already setting one up."

#### (6) Publication of Results From Basic Research Departments

In recent years, basic research has come to be done in Japanese firms. What do Japanese firms think about publishing the results from their basic research departments?

When we asked about the extent to which the results from the firms' own basic research departments are published in comparison with U.S. and European firms that are in the same kind of industry, 2% answered that now they "publish more than U.S. and European firms," 19% said "the same as U.S. and European firms," and 27% said that they "do not publish as much as U.S. and European firms."

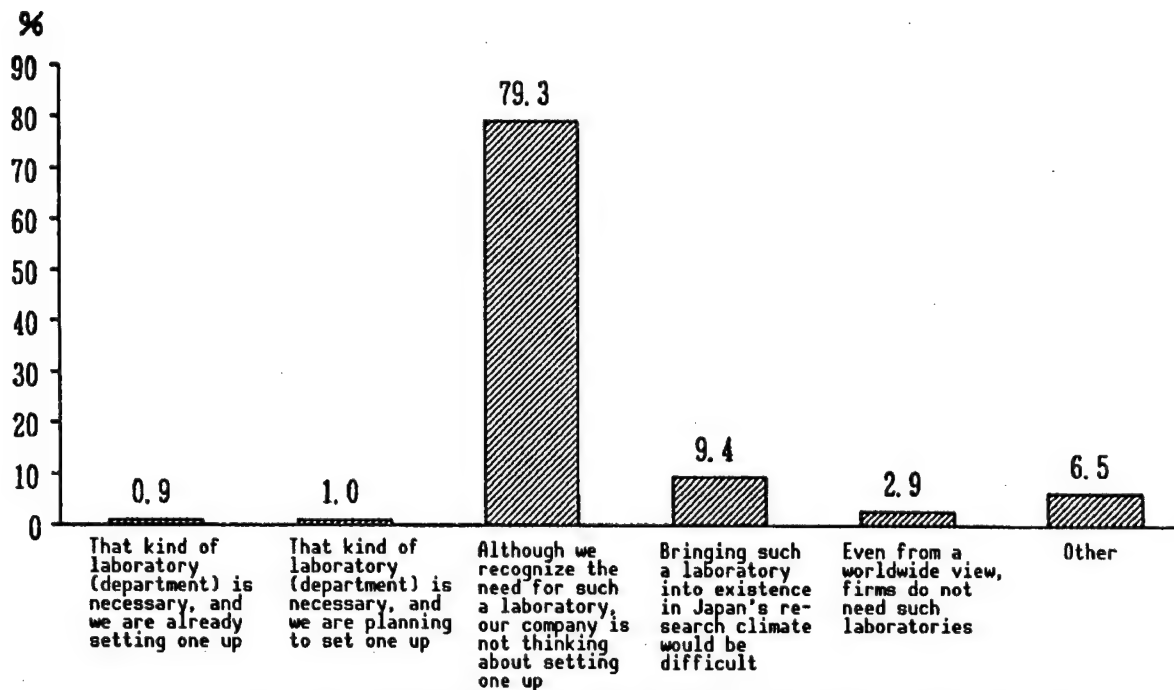


Figure 37. Establishment of Laboratories as Bell Labs That Play a Leading Role

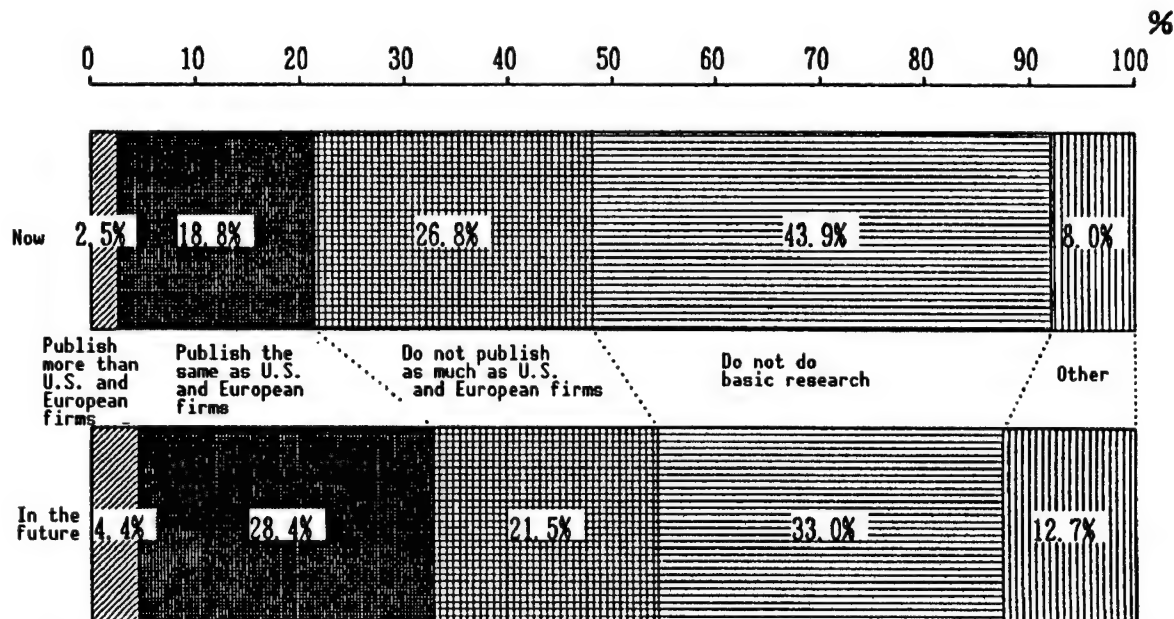


Figure 38. About Publishing the Results From Basic Research Departments

As for the future, 4% said that they will "publish more than U.S. and European firms," 28% said "the same as U.S. and European firms," and 21% said that they will "not publish as much as U.S. and European firms." This indicates that in the future firms will tend to publish their results more than firms do in the

United States and Europe, but it is noticeable that there are more firms that "will not publish as much" than there are firms that "will publish as much" (Figure 38). It is possible that this kind of outcome is due to the fact that the attitude towards basic research results differs with that in the U.S. and Europe. From now on, however, Japanese firms will be required to publish their results at least to an extent that is "the same as U.S. and European firms."

#### (7) Adopting the Same or Similar Rules as Overseas at R&D Strongpoints in Japan

Along with the increase in private Japanese firms' expansion of R&D activities beyond the borders of Japan, differences in systems and customs among countries have been looked at closely, and the differences in research management between Japanese and local firms are also starting to be recognized. Management in Japan is sometimes not that which is common throughout the world, and Japanese firms are being asked to recheck their research management and to establish rational, clear management that is common to that which is employed throughout the world. Referring to and adopting the rules of overseas R&D strongpoints and of overseas private firms' R&D strongpoints is thought to be linked with the steps of globalization.

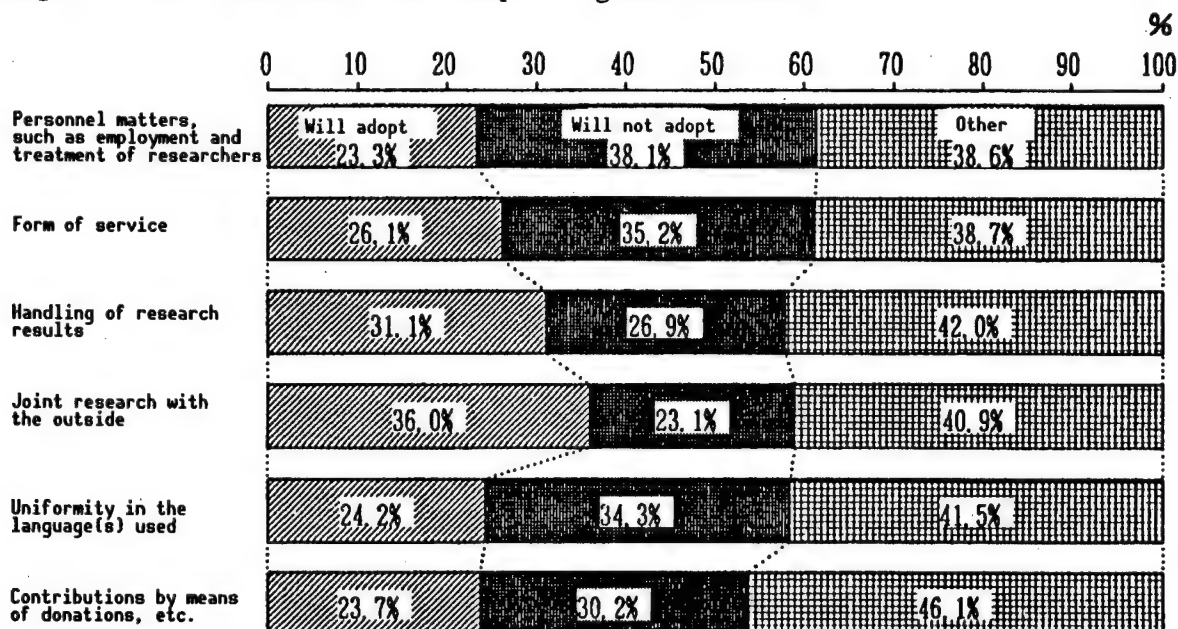


Figure 39. Adopting the Same or Similar Rules as Overseas at R&D Strongpoints in Japan

With respect to six items, we asked firms whether they consider adopting rules in the future at their R&D strongpoints in Japan that are the same or similar to those employed at their overseas R&D strongpoints or at overseas private firms' R&D strongpoints. Considering all the answers given except for "other," there were more "will adopt" than "will not adopt" answers for two items, "handling of research results" and "joint research with the outside," which was expected to a certain extent. However, there was also a surprisingly large number of firms that said they will adopt rules having to do with "personnel



matters, such as the employment and treatment of researchers," which pertains to the basis of business management. To a certain extent, firms are also reckoning with "uniformity in the language(s) used" (Figure 39). In general, there was a relatively large percentage of firms that answered "will adopt," which were more positive results than had been expected with respect to the adoption of the same rules. It is worth noting that firms with more than ¥100 billion in capital gave more "will adopt" responses than "will not adopt" for all of the items except "uniformity in the language(s) used."

#### 4. Making Rules To Facilitate the Activities of Private Firms

##### (1) Trouble over Intellectual Property Rights

In recent years, the U.S. and European countries have attached great importance to the protection of intellectual property rights. Concomitant with the internationalization of R&D activities by private Japanese firms, trouble is expected to increase.

We asked about the occurrence of trouble with overseas firms in different regions over intellectual property rights. More firms answered that trouble with firms in all the regions, but especially in the U.S., is "increasing" rather than "decreasing" (Figure 40).

By type of industry, the percentage of firms in leading-edge technology fields that said trouble is "increasing," particularly with the U.S., was much greater than

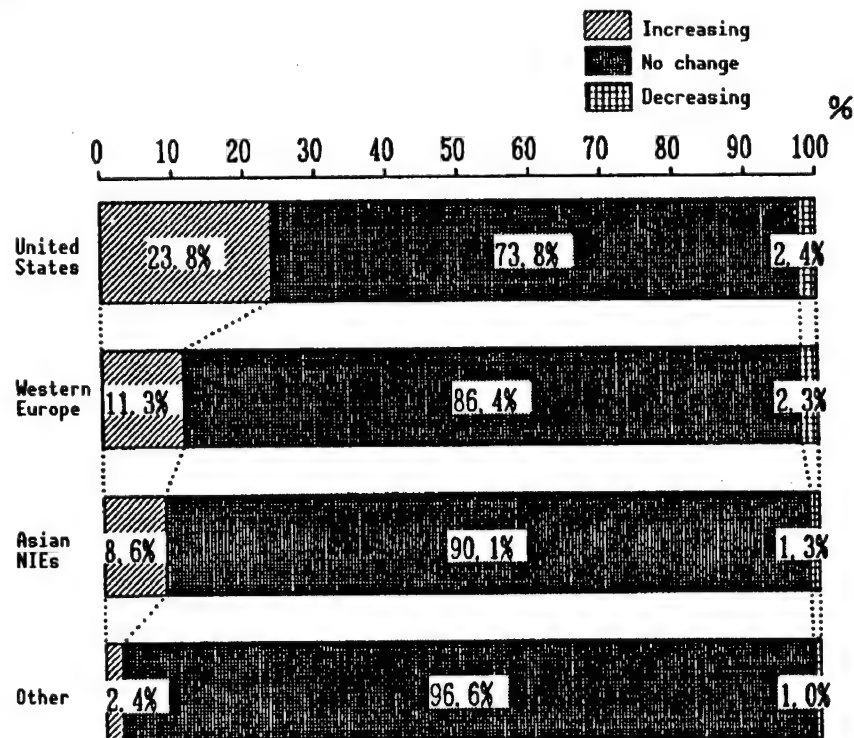


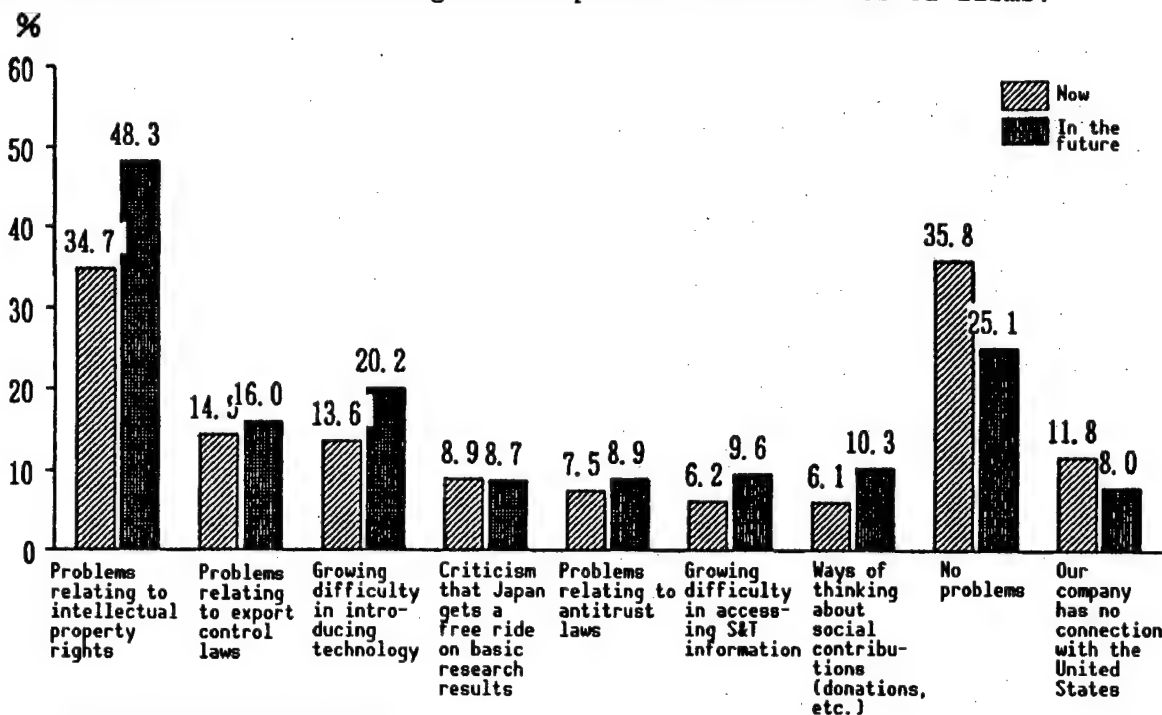
Figure 40. Trouble Over Intellectual Property Rights

the average. Large percentages of firms in the precision machinery industry (52%), the communications, electronics, and electrical measuring instruments industry (43%), and the electrical machinery and appliance industry (39%) said that trouble is "increasing." A large percentage of pharmaceuticals firms (33%) said trouble with Western Europe is "increasing," from which it is gathered that the Japanese pharmaceuticals industry is in fierce R&D competition with mainly Western European rivals.



## (2) S&T-Related Problems in Relationships with the U.S.

A variety of problems are expected to occur in relationships with other countries as Japan's S&T activities unfold internationally. With the United States, in particular, there is a salient trend, so we asked firms what kinds of problems relating to S&T are there now and will there be in their relationship with the United States. In their responses about now, 35% answered that there are "problems relating to intellectual property rights," 15% said "problems relating to export control laws," and 14% said "the growing difficulty in introducing technology." In their responses about the future, the percentage of firms that answered that there will be "no problems" dropped to 25%, while on the other hand the trend towards increasing problems was seen (Figure 41): 48% of the firms responded that there will be "problems relating to intellectual property rights," 20% said "the growing difficulty in introducing technology," and 16% said "problems relating to export control laws." Problems over intellectual property rights were brought up more than other problems, which is thought to express the uneasiness of firms.



(Note: Based on multiple responses)

Figure 41. S&T-Related Problems in Relationships With the U.S.

High percentages of those types of industries in which Japan has strong technological power answered that there are now and will be in the future "problems relating to intellectual property rights." For example, that was cited by over 50% of the firms in the communications, electronics, and electrical measuring instruments industry (72% now, 84% in the future), the precision machinery industry (57%, 61%), and the electrical machinery and appliance industry (53%, 59%). A much higher than average percentage, 38%, of firms in the communications, electronics, and electrical measuring instruments

industry also said that there are and will be "problems relating to export control laws." And, pharmaceuticals firms, whose R&D strength is less than that of the United States and Europe, said that "the growing difficulty in introducing technology" is a problem (28%, 37%).

### (3) Items for Which the Existence of a Worldwide Common Base in R&D Activities Is Desired

There are many problems that should be solved, such as the increase in the occurrence of trouble with other countries over intellectual property rights and the various problems with the United States. We asked firms about items for which it would be more desirable if there were a common, worldwide base in the R&D activities in which Japanese firms take an active part internationally. The largest number, 65%, answered "an intellectual property rights system," followed by 38% that said "product standards," 20% that said "product liability," and 19% said "environmental regulations." There are very many firms that want to see a stabilized intellectual property rights system (Figure 42).

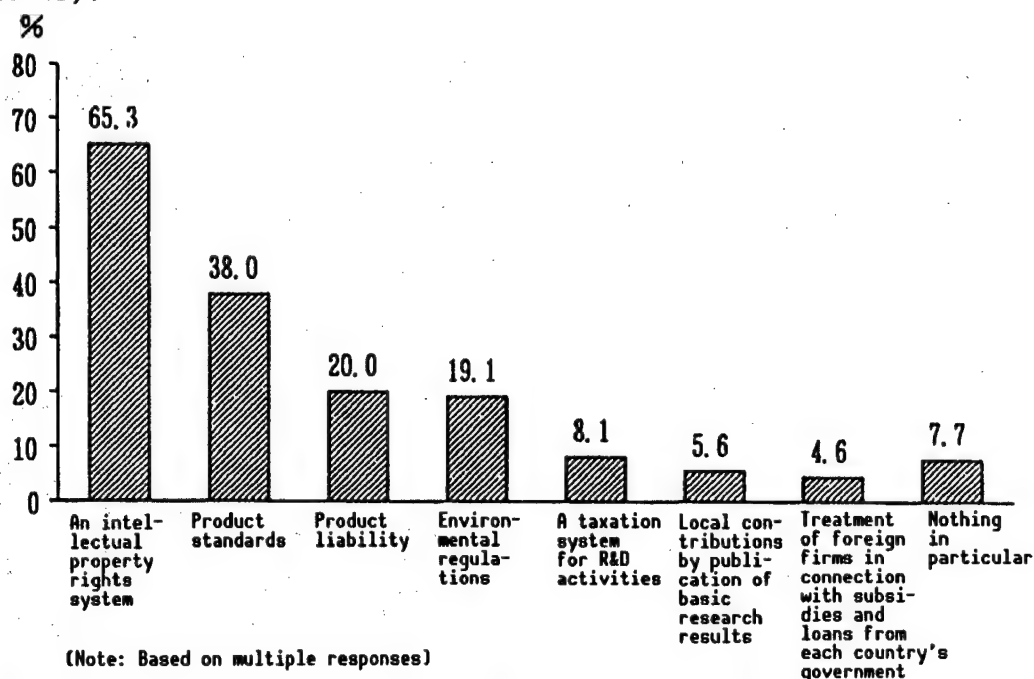


Figure 42. Items for Which the Existence of a Worldwide Common Base in R&D Activities Is Desired

### (4) R&D in Connection With Global Environmental Problems

Global environmental problems exemplified by the increase in the concentrations of carbon dioxide in the atmosphere, the destruction of the ozone layer by CFCs, desertification, and so forth are now being taken up as worldwide issues. R&D in connection with global environmental problems is an issue for all of humanity, and firms too are trying to find the best ways to take on R&D activities that have to do with global environmental problems.

When we asked firms about the state of their implementation of R&D (technology development) to help solve global environmental problems, 33% answered that they "are doing such R&D," 15% said that they are "investigating such R&D," and 52% said that they "are not doing such R&D." Already one-third of firms are carrying out some sort of R&D to deal with global environmental problems. By scale of capital, there is a trend where the firms with the larger amounts of capital tend to do more of that kind of R&D. Almost four-fifths, 77%, of firms with ¥50 billion or more in capital are already doing such R&D. By type of industry, there are large percentages of automobile firms and pulp and paper firms doing this kind of R&D.

We asked firms that answered that they "are doing such R&D" or "are investigating such R&D" about what sort of target R&D they are thinking of and about how their R&D relates to the global environmental policies that the governments of countries are implementing. More than half of the firms, 55% of them, answered that they are "developing technology for coping with

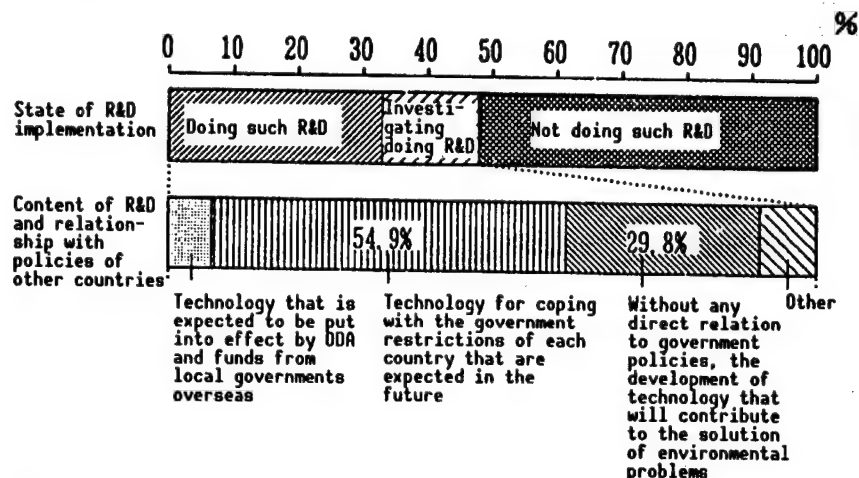


Figure 43. State of Private Firms' R&D (Technology development) for Solving Global Environmental Problems

the government restrictions of each country that are expected in the future," 30% said "without any direct relation to government policies, the development of technology that will contribute to the solution of environmental problems as a result of the effective utilization of tropical forests, more efficient recycling, etc.," and only a mere 7% said "technology that is expected to be put into effect by ODA and funds from local governments overseas." Firms are continuing to build up their R&D in the anticipation that governments will intensify legal regulations in order to deal with global environmental problems; we can gather that firms are not aiming at public category measures such as governmental ODA and projects that involve environmental measures. It is also noteworthy that 30% of firms are carrying out or are investigating the development of technology that will contribute to solving global environmental problems even if there is no direct connection with governmental policies (Figure 43).

Japanese firms have demonstrated their high level of R&D capabilities and have a past record of coping with common, public issues, as exemplified in their having managed to surmount the restraints imposed by strict regulations on automotive gas emissions. In order to make the most of Japanese firms' R&D power in dealing with global environmental problems, maintenance of the environment surrounding firms will become an important pillar of government

policies. In view of this, we asked how the state of affairs surrounding the activities of firms should change in order for firms to contribute better, whether directly or indirectly, towards solving global environmental problems by means of R&D. We asked the question separately with respect to the situation in Japan and the international situation.

With respect to the state of affairs in Japan, 31% answered that they would like to see an "expansion of the nation's support for R&D, e.g., subsidies, a tax-deduction system," 31% said "imparting the right knowledge to the citizens of Japan and raising their consciousness," and 20% said "rethinking Japan's legal regulations and other such systems." Firms have hopes about government assistance in the way of support systems for capital and in getting people excited about the issues (Figure 44).

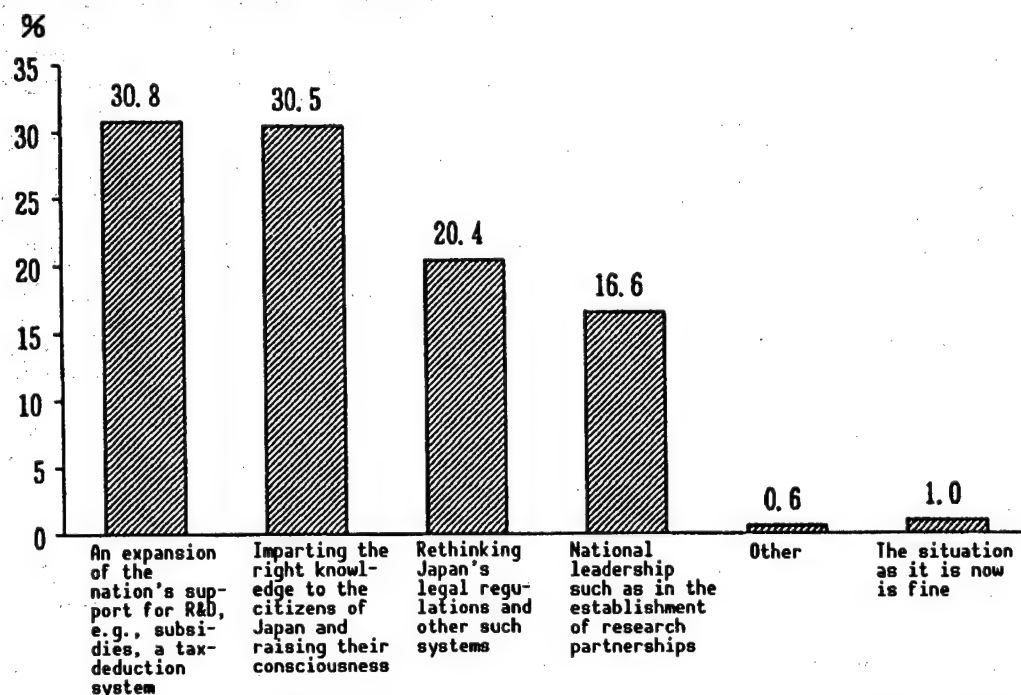


Figure 44. Changes in the Domestic Situation Surrounding Firms in Order for Them To Contribute to Solving Global Environmental Problems

With respect to the international state of affairs, 27% answered that they would like to see "the standardization of legal regulations and other such systems because those systems differ depending on the country," 23% said "leadership from the advanced countries, 22% said "mutual understanding with respect to the differences depending on the country," and 20% said "the smooth promotion of international joint research." We see that firms expect the standardization of international regulations and systems, and mutual understanding (Figure 45).

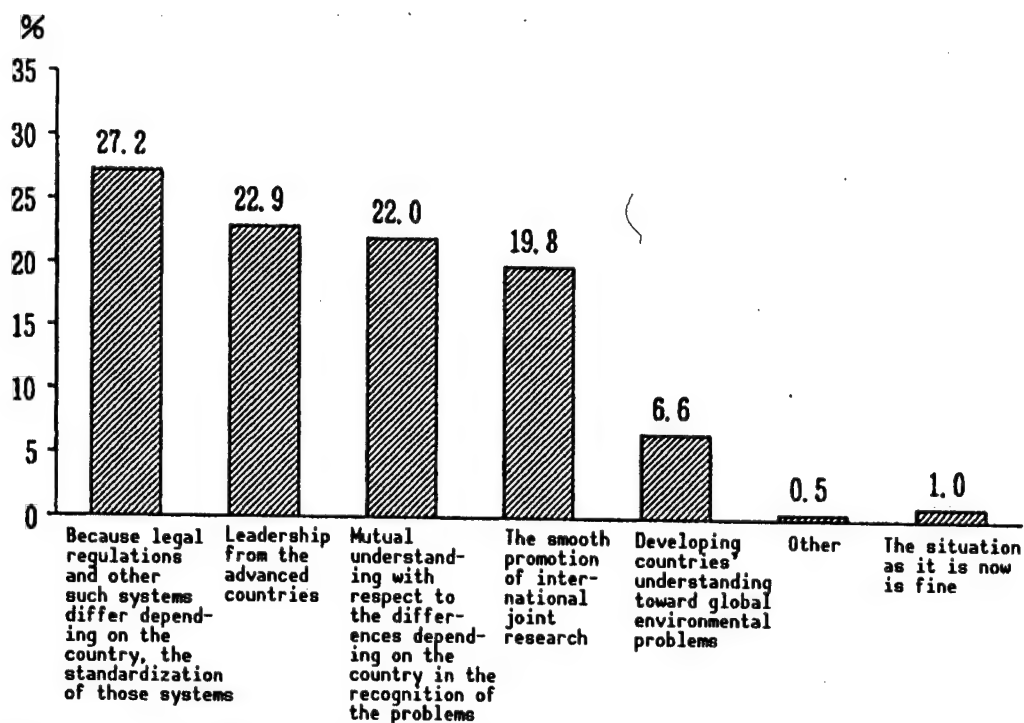


Figure 45. Changes in the International Situation Surrounding Firms in Order for Them To Contribute to Solving Global Environmental Problems

# IV. Aggregate Results of Survey (Summary)

## I. Summary of Firms' Responses

### 1. Sales and R&D Expenditures

By type of industry Classification	Sales (¥100 million)	Research expenditures (¥ million)	Research expenditures/ sales (%)
Total	2,077,555	7,402,161	3.56
(1) Agriculture, forestry, and fisheries	13,589	5,110	.38
(2) Mining	2,115	2,116	1.00
(3) Construction	247,889	297,710	1.20
(4) Food processing	93,452	98,342	1.05
(5) Textiles	23,092	50,524	2.19
(6) Pulp and paper	28,832	143,619	4.98
(7) Printing and publishing	20,075	17,361	.86
(8) Synthetic chemicals	79,524	349,829	4.40
(9) Oils, fats, and paints	6,106	17,791	2.91
(10) Pharmaceuticals	38,921	427,309	10.98
(11) Other chemicals	48,011	205,726	4.28
(12) Petroleum and coal products	117,954	97,969	.83
(13) Plastic products	18,510	63,029	3.41
(14) Rubber products	8,364	22,584	2.70
(15) Ceramics	33,247	113,097	3.40
(16) Iron and steel	97,473	269,025	2.76
(17) Nonferrous metals	43,085	83,050	1.93
(18) Metal products	18,504	24,351	1.32
(19) Machinery	108,241	570,997	5.28
(20) Electrical machinery and appliances	263,600	1,703,866	6.46
(21) Communications, electronics, and electrical measuring instruments	94,323 297,589	810,050 1,064,727	8.59 3.58
(22) Automobiles			
(23) Other transport machinery	48,871	196,777	4.03
(24) Precision machinery	35,424	237,271	6.70
(25) Other industries	18,939	40,258	2.13
(26) Transportation, communications, and public utilities	256,313	458,081	1.79
(27) Other types of industries	15,512	31,592	2.04
By scale of capital Classification	Sales (¥100 million)	Research expenditures (¥ million)	Research expenditures/ sales (%)
Total	2,077,555	7,402,161	3.56
(1) ¥1 to 5 billion	161,801	382,893	2.37
(2) ¥5 to 10 billion	176,117	379,820	2.16
(3) ¥10 to 50 billion	593,040	2,111,337	3.56
(4) ¥50 to 100 billion	354,435	1,142,432	3.22
(5) More than ¥100 billion	792,162	3,385,679	4.27

## 2. Research Expenditures by Nature of the R&D

By type of industry Classification	Research expenditures (¥ million)	Basic research expenditures (¥ million)	Applied research expenditures (¥ million)	Development research expenditures (¥ million)
Total	7,402,161	392,243	1,343,336	4,089,658
(1) Agriculture, forestry, and fisheries	5,110	299	1,369	1,552
(2) Mining	2,116	48	483	392
(3) Construction	297,710	8,230	43,610	201,735
(4) Food processing	98,342	10,078	31,064	40,383
(5) Textiles	50,524	3,569	9,585	27,528
(6) Pulp and paper	143,619	2,670	30,161	108,537
(7) Printing and publishing	17,361	1,021	4,495	11,845
(8) Synthetic chemicals	349,829	29,930	105,052	213,934
(9) Oils, fats, and paints	17,791	350	3,344	5,825
(10) Pharmaceuticals	427,309	75,352	97,837	211,131
(11) Other chemicals	205,726	11,896	47,772	87,982
(12) Petroleum and coal products	97,969	15,201	32,124	50,644
(13) Plastic products	63,029	4,950	17,818	39,222
(14) Rubber products	22,584	1,088	6,052	15,444
(15) Ceramics	113,097	10,621	32,266	67,809
(16) Iron and steel	269,025	38,870	55,945	172,988
(17) Nonferrous metals	83,050	4,497	21,484	58,089
(18) Metal products	24,351	258	4,067	19,456
(19) Machinery	570,997	36,106	95,511	409,198
(20) Electrical machinery and appliances	1,703,866	34,008	271,548	568,260
(21) Communications, electronics, and electrical measuring instruments	810,050	54,407	130,600	623,478
(22) Automobiles	1,064,727	21,209	186,826	813,242
(23) Other transport machinery	196,777	7,077	15,328	62,163
(24) Precision machinery	237,271	10,476	29,183	145,466
(25) Other industries	40,258	351	8,901	18,380
(26) Transportation, communications, and public utilities	458,081	8,776	50,509	94,690
(27) Other types of industries	31,592	905	10,402	20,285

By scale of capital Classification	Research expenditures (¥ million)	Basic research expenditures (¥ million)	Applied research expenditures (¥ million)	Development research expenditures (¥ million)
Total	7,402,161	392,243	1,343,336	4,089,658
(1) ¥1 to 5 billion	382,893	27,862	78,544	249,735
(2) ¥5 to 10 billion	379,820	32,797	84,148	225,103
(3) ¥10 to 50 billion	2,111,337	123,333	466,467	1,287,221
(4) ¥50 to 100 billion	1,142,432	68,550	253,107	711,860
(5) More than ¥100 billion	3,385,679	139,701	461,070	1,615,739

### 3. Number of Employees and Full-Time Researchers

By type of industry Classification	Number of employees	Number of full-time researchers	Number of full-time researchers/ employees (X)
Total	3,399,338	214,921	6.32
(1) Agriculture, forestry, and fisheries	9,114	113	1.24
(2) Mining	4,144	102	2.46
(3) Construction	271,164	4,858	1.79
(4) Food processing	112,802	4,421	3.92
(5) Textiles	63,019	3,387	5.37
(6) Pulp and paper	43,425	1,270	2.92
(7) Printing and publishing	26,448	754	2.85
(8) Synthetic chemicals	117,712	14,746	12.53
(9) Oils, fats, and paints	9,687	1,300	13.42
(10) Pharmaceuticals	97,733	11,657	11.93
(11) Other chemicals	69,458	9,265	13.34
(12) Petroleum and coal products	37,033	2,192	5.92
(13) Plastic products	27,837	2,260	8.12
(14) Rubber products	20,650	1,657	8.02
(15) Ceramics	61,526	2,955	4.80
(16) Iron and steel	176,356	4,562	2.59
(17) Nonferrous metals	66,888	3,364	5.03
(18) Metal products	47,844	2,112	4.41
(19) Machinery	230,476	20,450	8.87
(20) Electrical machinery and appliances	476,085	50,322	10.57
(21) Communications, electronics, and electrical measuring instruments	199,898	27,347	13.68
(22) Automobiles	379,342	26,883	7.09
(23) Other transport machinery	97,585	3,258	3.34
(24) Precision machinery	86,445	7,852	9.08
(25) Other industries	34,206	1,667	4.87
(26) Transportation, communications, and public utilities	601,014	4,983	.83
(27) Other types of industries	31,447	1,184	3.77
By scale of capital Classification	Number of employees	Number of full-time researchers	Number of full-time researchers/ employees (X)
Total	3,399,338	214,921	6.32
(1) ¥1 to 5 billion	310,092	14,396	4.64
(2) ¥5 to 10 billion	367,925	17,890	4.86
(3) ¥10 to 50 billion	960,833	67,895	7.07
(4) ¥50 to 100 billion	441,371	43,295	9.81
(5) More than ¥100 billion	1,319,117	71,445	5.42



#### 4. Number of Full-Time Researchers and R&D Expenditures

By type of industry	Classification	Number of full-time researchers	R&D expenditures (¥ million)	R&D expenditures/ full-time researchers (¥10,000)
Total		214,921	7,402,161	3,444.13
(1)	Agriculture, forestry, and fisheries	113	5,110	4,522.12
(2)	Mining	102	2,116	2,074.51
(3)	Construction	4,858	297,710	6,128.24
(4)	Food processing	4,421	98,342	2,224.43
(5)	Textiles	3,387	50,524	1,491.70
(6)	Pulp and paper	1,270	143,619	11,308.58
(7)	Printing and publishing	754	17,361	2,302.52
(8)	Synthetic chemicals	14,746	349,829	2,372.37
(9)	Oils, fats, and paints	1,300	17,791	1,368.54
(10)	Pharmaceuticals	11,657	427,309	3,665.69
(11)	Other chemicals	9,265	205,726	2,220.46
(12)	Petroleum and coal products	2,192	97,969	4,469.39
(13)	Plastic products	2,260	63,029	2,788.89
(14)	Rubber products	1,657	22,584	1,362.95
(15)	Ceramics	2,955	113,097	3,827.31
(16)	Iron and steel	4,562	269,025	5,897.08
(17)	Nonferrous metals	3,364	83,050	2,468.79
(18)	Metal products	2,112	24,351	1,152.98
(19)	Machinery	20,450	570,997	2,792.16
(20)	Electrical machinery and appliances	50,322	1,703,866	3,385.93
(21)	Communications, electronics, and electrical measuring instruments	27,347	810,050	2,962.12
(22)	Automobiles	26,883	1,064,727	3,960.60
(23)	Other transport machinery	3,258	196,777	6,039.81
(24)	Precision machinery	7,852	237,271	3,021.79
(25)	Other industries	1,667	40,258	2,415.00
(26)	Transportation, communications, and public utilities	4,983	458,081	9,192.88
(27)	Other types of industries	1,184	31,592	2,668.24

By scale of capital	Classification	Number of full-time researchers	R&D expenditures (¥ million)	R&D expenditures/ full-time researchers (¥10,000)
Total		214,921	7,402,161	3,444.13
(1)	¥1 to 5 billion	14,396	382,893	2,659.72
(2)	¥5 to 10 billion	17,890	379,820	2,123.09
(3)	¥10 to 50 billion	67,895	2,111,337	3,109.71
(4)	¥50 to 100 billion	43,295	1,142,432	2,638.72
(5)	More than ¥100 billion	71,445	3,385,679	4,738.86

# 5. Number of Patents Held and Number of Non-Japanese Researchers

	Number of patents held in Japan	Number of patents held outside Japan	Number of non-Japanese researchers
Total	368,964	273,997	683
By type of industry			
(1) Agriculture, forestry, and fisheries	290	38	0
(2) Mining	81	21	0
(3) Construction	7,342	1,109	19
(4) Food processing	3,646	3,219	9
(5) Textiles	4,976	3,547	0
(6) Pulp and paper	2,114	1,410	2
(7) Printing and publishing	2,589	1,165	2
(8) Synthetic chemicals	40,303	32,554	22
(9) Oils, fats, and paints	1,398	1,467	3
(10) Pharmaceuticals	5,569	20,556	30
(11) Other chemicals	11,006	16,554	15
(12) Petroleum and coal products	3,291	3,525	3
(13) Plastic products	4,140	2,730	0
(14) Rubber products	1,248	1,025	1
(15) Ceramics	4,423	3,138	7
(16) Iron and steel	18,746	9,710	9
(17) Nonferrous metals	10,603	5,491	168
(18) Metal products	13,968	11,490	1
(19) Machinery	19,009	17,548	89
(20) Electrical machinery and appliances	95,102	57,014	105
(21) Communications, electronics, and electrical measuring instruments	44,174	23,591	70
(22) Automobiles	31,452	34,185	18
(23) Other transport machinery	10,493	4,260	5
(24) Precision machinery	15,800	22,150	56
(25) Other industries	4,612	2,424	13
(26) Transportation, communications, and public utilities	11,331	3,418	34
(27) Other types of industries	1,258	658	2
By scale of capital			
(1) ¥1 to 5 billion	26,756	11,827	56
(2) ¥5 to 10 billion	41,986	28,372	40
(3) ¥10 to 50 billion	109,102	104,147	330
(4) ¥50 to 100 billion	68,669	59,255	67
(5) More than ¥100 billion	122,451	70,396	190

Sales and R&D Expenditures of Overseas Affiliated Firms (II.) and Number of R&D Strongpoints Overseas (IV. Question 1)			
	Sales of overseas affiliated firms (¥ million)	R&D expenditures of overseas affiliated firms (¥ million)	Number of R&D strongpoints overseas
Total	28,815,986	367,910	276
By type of industry			
(1) Agriculture, forestry, and fisheries	534,307	0	0
(2) Mining	15,559	0	0
(3) Construction	590,843	0	0
(4) Food processing	290,147	1,534	14
(5) Textiles	47,999	342	1
(6) Pulp and paper	28,441	110	2
(7) Printing and publishing	2,427	100	1
(8) Synthetic chemicals	797,469	2,090	11
(9) Oils, fats, and paints	5,303	235	8
(10) Pharmaceuticals	439,491	13,353	29
(11) Other chemicals	410,741	1,975	22
(12) Petroleum and coal products	1,578,904	0	2
(13) Plastic products	38,881	0	0
(14) Rubber products	19,907	338	2
(15) Ceramics	1,347,301	40,067	3
(16) Iron and steel	4,53,582	0	5
(17) Nonferrous metals	75,181	60	7
(18) Metal products	73,443	1,000	5
(19) Machinery	1,314,477	17,298	36
(20) Electrical machinery and appliances	7,876,318	81,139	54
(21) Communications, electronics, and electrical measuring instruments	1,814,105	31,520	9
(22) Automobiles	6,981,241	142,719	30
(23) Other transport machinery	602,235	0	13
(24) Precision machinery	2,101,228	2,321	17
(25) Other industries	1,003,411	21,709	4
(26) Transportation, communications, and public utilities	330,000	10,000	0
(27) Other types of industries	43,045	0	1
By scale of capital			
(1) ¥1 to 5 billion	1,340,275	3,674	21
(2) ¥5 to 10 billion	1,787,372	86,318	57
(3) ¥10 to 50 billion	6,792,950	57,469	99
(4) ¥50 to 100 billion	9,676,352	164,128	55
(5) More than ¥100 billion	9,219,037	56,321	44

Number of Joint Research Efforts by Overseas R&D Strongpoints (IV. Question 8), No. of Non-Japanese Researchers by Nationality

	Number of joint research efforts by overseas R&D strongpoints		Number of non-Japanese researchers, by nationality							
			United States		Western Europe		Asia		Other	
	5 yrs ago	Now	3 yrs ago	Now	3 yrs ago	Now	3 yrs ago	Now	3 yrs ago	Now
Total	73	214	74	189	48	125	87	397	10	40
By type of industry										
(1) Agriculture, forestry, and fisheries	0	0	0	0	0	0	0	0	0	0
(2) Mining	0	0	0	0	0	0	0	0	0	0
(3) Construction	0	0	3	3	1	1	1	22	0	0
(4) Food processing	1	22	1	1	3	3	1	8	0	0
(5) Textiles	0	0	0	0	0	0	1	0	0	0
(6) Pulp and paper	0	0	1	1	0	0	1	1	0	0
(7) Printing and publishing	0	0	0	0	0	0	1	3	0	0
(8) Synthetic chemicals	0	8	0	3	2	5	10	23	0	0
(9) Oils, fats, and paints	0	1	0	2	2	6	3	10	0	4
(10) Pharmaceuticals	9	30	4	7	7	9	8	15	2	1
(11) Other chemicals	0	2	3	5	2	0	6	12	1	2
(12) Petroleum and coal products	0	0	0	0	0	0	1	3	0	0
(13) Plastic products	0	0	1	0	0	0	0	0	0	0
(14) Rubber products	0	0	0	0	0	0	0	1	0	0
(15) Ceramics	0	4	0	0	0	0	1	6	0	1
(16) Iron and steel	0	7	2	2	1	2	2	8	0	0
(17) Nonferrous metals	1	25	2	4	1	4	6	37	4	2
(18) Metal products	0	4	0	0	0	0	0	0	0	0
(19) Machinery	1	27	3	65	5	7	5	16	0	0
(20) Electrical machinery and appliances	5	18	7	51	8	47	6	132	0	9
(21) Communications, electronics, elect. measuring instruments	6	11	6	16	7	10	10	50	2	12
(22) Automobiles	2	42	4	11	0	2	3	10	0	3
(23) Other transport machinery	0	0	2	4	1	1	1	4	0	0
(24) Precision machinery	2	7	2	3	7	14	8	23	0	0
(25) Other industries	3	6	0	0	0	0	1	3	0	0
(26) Transportation, communications, and public utilities	0	0	2	10	1	13	0	7	1	6
(27) Other types of industries	0	0	0	1	0	1	1	3	0	0
By scale of capital										
(1) ¥1 to 5 billion	1	27	5	4	13	18	13	35	1	2
(2) ¥5 to 10 billion	7	25	4	9	1	8	13	48	1	6
(3) ¥10 to 50 billion	26	69	24	45	18	43	28	184	3	3
(4) ¥50 to 100 billion	26	66	7	28	4	7	21	66	4	4
(5) More than ¥100 billion	3	27	34	103	12	49	12	64	1	25

Number of Researchers Sent, Received and Number of Joint Research Efforts With Foreign Countries by Strongpoints in Japan  
(U. Question 6)

	Non-Japanese researchers accepted as trainees	Non-Japanese researchers accepted as part of mutual dispatching	Japanese research- ers sent to foreign countries	Number of joint research efforts with foreign countries by strongpoints in Japan	Now
Total	538	75	1,059	967	1,773
By type of industry					
(1) Agriculture, forestry, and fisheries	1	0	0	5	13
(2) Mining	2	1	8	0	0
(3) Construction	22	7	57	24	110
(4) Food processing	3	1	63	40	53
(5) Textiles	2	0	16	13	21
(6) Pulp and paper	0	0	12	10	14
(7) Printing and publishing	2	0	4	1	5
(8) Synthetic chemicals	16	0	84	47	108
(9) Oils, fats, and paints	10	5	8	2	7
(10) Pharmaceuticals	7	6	130	68	155
(11) Other chemicals	19	2	50	106	174
(12) Petroleum and coal products	3	2	17	12	26
(13) Plastic products	2	1	9	10	12
(14) Rubber products	1	0	9	3	4
(15) Ceramics	15	3	7	59	70
(16) Iron and steel	30	2	59	23	26
(17) Nonferrous metals	32	0	14	33	74
(18) Metal products	52	0	12	7	9
(19) Machinery	43	10	46	107	196
(20) Electrical machinery and appliances	66	0	138	77	180
(21) Communications, electronics, elec. measuring instruments	22	9	77	31	65
(22) Automobiles	24	19	60	136	184
(23) Other transport machinery	4	0	67	12	7
(24) Precision machinery	59	0	46	30	54
(25) Other industries	4	0	2	13	20
(26) Transportation, communications, and public utilities	6	7	36	36	121
(27) Other types of industries	91	0	28	62	65
By scale of capital					
(1) ¥1 to 5 billion	81	7	67	141	242
(2) ¥5 to 10 billion	88	10	133	100	208
(3) ¥10 to 50 billion	168	16	411	417	750
(4) ¥50 to 100 billion	146	21	204	132	259
(5) More than ¥100 billion	55	21	244	177	314

### III. Perception of International Situation in Relation to S&T

#### Question 1.

Comparison of R&D strength with that of U.S. and Europe, 5 years ago

By type of industry	No. of firms surveyed	Frequency (total value)	Japan>U.S.>Europe	Japan>Europe>U.S.	U.S.>Japan>Europe	U.S.>Europe>Japan	Europe>Japan>U.S.
Firms responding	831	782	72	39	78	110	34
Frequency (total value)/Lateral percentage	831	782.00	72	39	78	110	34
(1) Agriculture, forestry, and fisheries	5	3	0	0	0	1	0
(2) Mining	4	4	0	0	0	3	0
(3) Construction	82	74	7	2	6	8	3
(4) Food processing	50	46	1	0	6	1	2
(5) Textiles	26	21	1	2	0	1	1
(6) Pulp and paper	19	18	0	0	3	3	1
(7) Printing and publishing	3	3	0	0	0	0	0
(8) Synthetic chemicals	62	57	5	1	3	16	1
(9) Oils, fats, and paints	11	11	1	0	1	2	0
(10) Pharmaceuticals	38	38	0	0	2	16	0
(11) Other chemicals	35	34	4	1	3	8	2
(12) Petroleum and coal products	18	17	0	0	0	10	0
(13) Plastic products	18	18	1	1	2	2	1
(14) Rubber products	6	6	0	0	0	1	0
(15) Ceramics	32	32	5	1	2	2	3
(16) Iron and steel	36	34	5	9	0	1	0
(17) Nonferrous metals	30	29	2	0	5	2	0
(18) Metal products	23	22	0	1	2	7	1
(19) Machinery	64	61	6	8	5	3	3
(20) Electrical machinery and appliances	84	80	9	7	13	5	0
(21) Communications, electronics, and electrical measuring instruments	39	37	5	0	13	6	0
(22) Automobiles	47	43	10	0	2	3	6
(23) Other transport machinery	18	18	3	2	2	2	0
(24) Precision machinery	24	21	5	1	3	1	2
(25) Other industries	14	14	2	0	1	3	0
(26) Transportation, communications, and public utilities	26	24	0	1	3	0	3
(27) Other types of industries	17	17	0	0	1	3	2

#### By scale of capital

Comparison of R&D strength with that of U.S. and Europe, 5 years ago

By type of industry	No. of firms surveyed	Frequency (total value)	Japan>U.S.>Europe	Japan>Europe>U.S.	U.S.>Japan>Europe	U.S.>Europe>Japan	Europe>Japan>U.S.
Firms responding	831	782	72	39	78	110	34
Frequency (total value)/Lateral percentage	831	782.00	72	39	78	110	34
(1) ¥1 to 5 billion	308	290	31	14	33	32	15
(2) ¥5 to 10 billion	199	186	14	11	21	24	10
(3) ¥10 to 50 billion	240	229	21	10	18	41	7
(4) ¥50 to 100 billion	45	41	1	0	4	10	1
(5) More than ¥100 billion	39	36	5	4	2	3	1

Comparison of R&D strength with that of U.S. and Europe, 5 years ago

By type of industry	No. of firms surveyed	Frequency (total value)	Europe (U.S.) Japan	Japan (U.S.) Europe	U.S. (Japan) Europe	Europe (U.S.) Japan	Japan (U.S.) Europe
Firms responding	831	782	42	47	60	18	54
Frequency (total value)/Lateral percentage	831	782.00	42	5.37	6.01	7.67	6.91
(1) Agriculture, forestry, and fisheries	5	3	0	0.00	33.33	33.33	0.00
(2) Mining	4	4	1	25.00	0.00	0.00	0.00
(3) Construction	82	74	4	5.41	9.46	5.41	9.46
(4) Food processing	50	46	3	6.52	6.52	8.70	10.87
(5) Textiles	26	21	1	4.76	14.29	0.00	9.52
(6) Pulp and paper	19	18	4	22.22	0.00	11.11	5.56
(7) Printing and publishing	3	3	0	0.00	0.00	0.00	0.00
(8) Synthetic chemicals	62	57	1	1.75	3.51	8.77	33.33
(9) Oils, fats, and paints	11	11	1	9.09	0.00	27.27	3.51
(10) Pharmaceuticals	38	38	2	5.26	0.00	5.26	9.09
(11) Other chemicals	35	34	1	2.94	0.00	14.71	2.63
(12) Petroleum and coal products	18	17	3	17.65	0.00	0.00	5.88
(13) Plastic products	18	18	0	0.00	11.11	16.57	0.00
(14) Rubber products	6	6	2	33.33	0.00	16.57	11.11
(15) Ceramics	32	32	0	0.00	18.75	6.25	0.00
(16) Iron and steel	36	34	0	0.00	14.71	0.00	3.13
(17) Nonferrous metals	30	29	0	0.00	0.00	0.00	5.88
(18) Metal products	23	22	2	9.09	13.64	17.24	13.79
(19) Machinery	64	61	4	6.56	8.20	6.56	4.55
(20) Electrical machinery and appliances	84	80	4	5.00	2.50	11.25	1.64
(21) Communications, electronics, and electrical measuring instruments	39	37	0	0.00	5.41	8.11	11.25
(22) Automobiles	47	43	2	4.65	0.00	6.98	10.81
(23) Other transport machinery	18	18	3	16.67	0.00	5.56	6.98
(24) Precision machinery	24	21	0	0.00	0.00	5.56	5.56
(25) Other industries	14	14	2	14.29	7.14	0.00	4.76
(26) Transportation, communications, and public utilities	26	24	0	0.00	0.00	8.33	14.29
(27) Other types of industries	17	17	2	11.76	0.00	5.88	4.17
By scale of capital							

Comparison of R&D strength with that of U.S. and Europe, 5 years ago

By type of industry	No. of firms surveyed	Frequency (total value)	Europe (U.S.) Japan	Japan (U.S.) Europe	U.S. (Japan) Europe	Europe (U.S.) Japan	Japan (U.S.) Europe
Firms responding	831	782	42	47	60	18	54
Frequency (total value)/Lateral percentage	831	782.00	42	5.37	6.01	7.67	6.91
(1) ¥1 to 5 billion	308	290	13	4.48	6.55	6.21	5.17
(2) ¥5 to 10 billion	199	186	15	8.06	5.38	4.84	6.99
(3) ¥10 to 50 billion	240	229	14	6.11	5.68	8.30	8.30
(4) ¥50 to 100 billion	45	41	0	0.00	7.32	14.63	9.76
(5) More than ¥100 billion	39	36	0	0.00	5.56	22.22	8.33

Comparison of R&D strength with that of U.S. and Europe, 5 years ago

By type of industry	No. of firms surveyed	Frequency (total value)	Japan=Europe U.S.	U.S.=Europe Japan	Japan=U.S. Europe	Don't know
Firms responding	831	782	21	75	90	42
Frequency (total value)/Lateral percent	831	782.00	21	2.69	75	11.51
(1) Agriculture, forestry, and fisher	5	3	0	0.00	0	0.00
(2) Mining	4	4	0	0.00	0	0.00
(3) Construction	82	74	0	0.00	0	0.00
(4) Food processing	50	46	1	2.17	5	12.16
(5) Textiles	26	21	0	0.00	8	10.87
(6) Pulp and paper	19	18	0	0.00	3	9.52
(7) Printing and publishing	3	3	0	0.00	1	0.00
(8) Synthetic chemicals	62	57	1	1.75	33.33	0.00
(9) Oils, fats, and paints	11	11	0	0.00	4	3.51
(10) Pharmaceuticals	38	38	0	0.00	1	0.00
(11) Other chemicals	35	34	0	0.00	0	0.00
(12) Petroleum and coal products	18	17	0	0.00	5	5.88
(13) Plastic products	18	18	0	0.00	1	5.88
(14) Rubber products	6	6	0	0.00	1	16.67
(15) Ceramics	32	32	1	3.13	5	15.63
(16) Iron and steel	36	34	1	2.94	5	14.71
(17) Nonferrous metals	30	29	1	3.45	4	13.79
(18) Metal products	23	22	1	4.55	3	13.64
(19) Machinery	64	61	6	9.84	5	8.20
(20) Electrical machinery and appliances	84	80	1	1.25	12	15.00
(21) Communications, electronics, and electrical measuring instruments	39	37	0	0.00	1	2.70
(22) Automobiles	47	43	3	6.98	4	9.30
(23) Other transport machinery	18	18	1	5.56	1	5.56
(24) Precision machinery	24	21	2	9.52	1	4.76
(25) Other industries	14	14	0	0.00	1	7.14
(26) Transportation, communications, and public utilities	26	24	2	8.33	8	33.33
(27) Other types of industries	17	17	0	0.00	3	17.65

Comparison of R&D strength with that of U.S. and Europe, 5 years ago

By scale of capital	No. of firms surveyed	Frequency (total value)	Japan=Europe U.S.	U.S.=Europe Japan	Japan=U.S. Europe	Don't know
Firms responding	831	782	21	75	90	42
Frequency (total value)/Lateral percent	831	782.00	21	2.69	75	11.51
(1) ¥1 to 5 billion	308	290	9	3.10	35	12.07
(2) ¥5 to 10 billion	199	186	3	1.61	22	11.83
(3) ¥10 to 50 billion	240	229	5	2.18	23	10.04
(4) ¥50 to 100 billion	45	41	4	9.76	6	4.88
(5) More than ¥100 billion	39	36	0	0.00	1	16.67



Comparison of R&D strength with that of U.S. and Europe, now

By type of industry	No. of firms surveyed	Frequency (total value)	Japan>U.S.>Europe	Japan>U.S.>Europe	U.S.>Japan>Europe	U.S.>Europe>Japan	Europe>Japan>U.S.
Firms responding	831	804	116	66	48	45	25
Frequency (total value)/Lateral percentage	831	804.00	116	66	48	45	25
(1) Agriculture, forestry, and fisheries	5	3	0	0	0	1	0
(2) Mining	4	4	0	0	0	1	0
(3) Construction	82	79	10	3	6	2	2
(4) Food processing	50	48	2	1	3	0	1
(5) Textiles	26	23	2	3	0	1	3
(6) Pulp and paper	19	18	2	0	1	1	2
(7) Printing and publishing	3	3	0	1	0	0	0
(8) Synthetic chemicals	62	58	5	2	5	7	2
(9) Oils, fats, and paints	11	11	1	0	1	1	0
(10) Pharmaceuticals	38	38	1	0	2	9	0
(11) Other chemicals	35	34	7	1	2	3	1
(12) Petroleum and coal products	18	17	0	1	1	6	1
(13) Plastic products	18	18	3	2	1	0	0
(14) Rubber products	6	6	0	0	1	0	0
(15) Ceramics	32	32	6	1	1	1	2
(16) Iron and steel	36	36	4	13	0	1	0
(17) Nonferrous metals	30	30	6	1	2	2	0
(18) Metal products	23	22	1	2	0	0	1
(19) Machinery	64	61	8	12	3	2	2
(20) Electrical machinery and appliances	84	82	18	10	6	2	2
(21) Communications, electronics, and electrical measuring instruments	39	39	11	0	6	1	0
(22) Automobiles	47	45	11	4	2	0	2
(23) Other transport machinery	18	18	6	2	0	2	0
(24) Precision machinery	24	23	6	3	1	0	0
(25) Other industries	14	14	3	1	1	0	1
(26) Transportation, communications, and public utilities	26	25	2	1	1	0	3
(27) Other types of industries	17	17	1	2	2	2	0

Comparison of R&D strength with that of U.S. and Europe, now

By scale of capital	No. of firms surveyed	Frequency (total value)	Japan>U.S.>Europe	Japan>U.S.>Europe	U.S.>Japan>Europe	U.S.>Europe>Japan	Europe>Japan>U.S.
Firms responding	831	804	116	66	48	45	25
Frequency (total value)/Lateral percentage	831	804.00	116	66	48	45	25
(1) ¥1 to 5 billion	308	300	47	26	15	9	10
(2) ¥5 to 10 billion	199	193	25	17	19	12	6
(3) ¥10 to 50 billion	240	233	34	16	6	18	7
(4) ¥50 to 100 billion	45	42	3	1	5	4	1
(5) More than ¥100 billion	39	36	7	6	3	2	1

Comparison of R&D strength with that of U.S. and Europe, now

By type of industry	No. of firms surveyed	Frequency (total value)	Europe (U.S.) Japan	Japan (U.S.) Europe	U.S. (Japan) Europe	Europe (Japan) U.S.	Japan (U.S.) Europe
Firms responding	831	804	16	74	46	23	90
Frequency (total value)/Lateral percentage	831	804.00	16	74	46	23	90
(1) Agriculture, forestry, and fisheries	5	3	0	0	0.00	0	0
(2) Mining	4	4	1	0	0.00	0	0
(3) Construction	82	79	3	12	15.19	1	9
(4) Food processing	50	48	1	6	12.50	1	8
(5) Textiles	26	23	0	5	21.74	0	1
(6) Pulp and paper	19	18	1	1	5.56	1	1
(7) Printing and publishing	3	3	0	0	0.00	0	0
(8) Synthetic chemicals	62	58	1	4	6.90	7	4
(9) Oils, fats, and paints	11	11	0	0	0.00	0	0
(10) Pharmaceuticals	38	38	0	0	0.00	0	0
(11) Other chemicals	35	34	2	3	8.82	2	5
(12) Petroleum and coal products	18	17	1	1	5.56	1	2
(13) Plastic products	18	18	1	0	0.00	0	0
(14) Rubber products	6	6	0	0	0.00	0	0
(15) Ceramics	32	32	0	7	21.88	1	5
(16) Iron and steel	36	36	0	0	0.00	0	0
(17) Nonferrous metals	30	30	0	2	6.67	0	0
(18) Metal products	23	22	1	5	22.73	1	6
(19) Machinery	64	61	1	4	6.56	0	0
(20) Electrical machinery and appliances	84	82	2	4	4.88	0	0
(21) Communications, electronics, and electrical measuring instruments	39	39	0	2	5.13	1	1
(22) Automobiles	47	45	0	4	8.89	1	5
(23) Other transport machinery	18	18	0	0	0.00	0	0
(24) Precision machinery	24	23	0	2	8.70	0	0
(25) Other industries	14	14	1	2	14.29	0	2
(26) Transportation, communications, and public utilities	26	25	0	2	8.00	0	2
(27) Other types of industries	17	17	0	0	0.00	0	1

Comparison of R&D strength with that of U.S. and Europe, now

By scale of capital	No. of firms surveyed	Frequency (total value)	Europe (U.S.) Japan	Japan (U.S.) Europe	U.S. (Japan) Europe	Europe (Japan) U.S.	Japan (U.S.) Europe
Firms responding	831	804	16	74	46	23	90
Frequency (total value)/Lateral percentage	831	804.00	16	74	46	23	90
(1) ¥1 to 5 billion	308	300	6	32	10.67	14	25
(2) ¥5 to 10 billion	199	193	4	18	9.33	12	19
(3) ¥10 to 50 billion	240	233	6	18	7.73	10	31
(4) ¥50 to 100 billion	45	42	0	5	11.90	0	8
(5) More than ¥100 billion	39	36	0	1	2.78	0	7

Comparison of R&D strength with that of U.S. and Europe, now

By type of industry	No. of firms surveyed	Frequency (total value)	Japan=Europe) U.S.	U.S.=Europe) Japan	Japan=U.S.= Europe	Don't know
Firms responding	831	804	35	49	127	44
Frequency (total value)/Lateral percent	831	804.00	35	4.35	127	15.80
(1) Agriculture, forestry, and fisher	5	3	0	0.00	0	0
(2) Mining	4	4	0	0.00	0	0
(3) Construction	82	79	1	1.27	0	0
(4) Food processing	50	48	1	2.08	13	11
(5) Textiles	26	23	1	4.35	10	8
(6) Pulp and paper	19	18	0	0.00	4	2
(7) Printing and publishing	3	3	0	0.00	4	0
(8) Synthetic chemicals	62	58	1	1.72	1	0
(9) Oils, fats, and paints	11	11	1	9.09	5	2
(10) Pharmaceuticals	38	38	0	0.00	3	0
(11) Other chemicals	35	34	0	0.00	4	1
(12) Petroleum and coal products	18	17	0	0.00	6	0
(13) Plastic products	18	18	0	0.00	1	0
(14) Rubber products	6	6	2	33.33	4	0
(15) Ceramics	32	32	2	6.25	1	0
(16) Iron and steel	36	36	0	0.00	4	0
(17) Nonferrous metals	30	30	2	6.67	5	0
(18) Metal products	23	22	1	4.55	6	5
(19) Machinery	64	61	7	11.48	9	1
(20) Electrical machinery and appliances	84	82	3	3.66	8	3
(21) Communications, electronics, and electrical measuring instruments	39	39	0	0.00	15	2
(22) Automobiles	47	45	5	11.11	4	1
(23) Other transport machinery	18	18	2	11.11	2	2
(24) Precision machinery	24	23	4	17.39	1	1
(25) Other industries	14	14	0	0.00	1	2
(26) Transportation, communications, and public utilities	26	25	2	8.00	0	0
(27) Other types of industries	17	17	0	0.00	8	3

Comparison of R&D strength with that of U.S. and Europe, now

By scale of capital	No. of firms surveyed	Frequency (total value)	Japan=Europe) U.S.	U.S.=Europe) Japan	Japan=U.S.= Europe	Don't know
Firms responding	831	804	35	49	127	44
Frequency (total value)/Lateral percent	831	804.00	35	4.35	127	15.80
(1) ¥1 to 5 billion	308	300	18	6.00	48	27
(2) ¥5 to 10 billion	199	193	8	4.15	26	9
(3) ¥10 to 50 billion	240	233	7	3.00	39	5
(4) ¥50 to 100 billion	45	42	2	4.76	7	2
(5) More than ¥100 billion	39	36	0	0.00	7	1

Comparison of R&D strength with that of U.S. and Europe, after 5 years

By type of industry	No. of firms surveyed	Frequency (total value)	Japan>U.S.>Europe	Japan>Europe>U.S.	U.S.>Japan>Europe	U.S.>Europe>Japan	Europe>Japan>U.S.
Firms responding	831	782	144	92	31	26	5
Frequency (total value)/Lateral percentage	831	782.00	144	92	31	26	5
(1) Agriculture, forestry, and fisheries	5	3	0	0	1	33.33	0
(2) Mining	4	4	0	0	1	25.00	0
(3) Construction	82	75	16	3	2	2.67	0
(4) Food processing	50	46	6	1	1	2.17	0
(5) Textiles	26	21	3	5	1	4.76	0
(6) Pulp and paper	19	18	3	1	2	11.11	0
(7) Printing and publishing	3	3	0	0	0	0.00	0
(8) Synthetic chemicals	62	57	6	3	5	8.77	2
(9) Oils, fats, and paints	11	11	1	1	1	9.09	0
(10) Pharmaceuticals	38	37	1	1	0	2.70	0
(11) Other chemicals	35	34	7	2	1	2.94	0
(12) Petroleum and coal products	18	17	0	0	1	5.88	0
(13) Plastic products	18	18	2	2	2	11.11	0
(14) Rubber products	6	6	1	1	0	16.67	0
(15) Ceramics	32	32	6	3	1	9.38	1
(16) Iron and steel	36	34	4	13	1	38.24	0
(17) Nonferrous metals	30	29	7	2	2	6.90	0
(18) Metal products	23	22	2	2	0	9.09	0
(19) Machinery	64	60	10	15	2	25.00	0
(20) Electrical machinery and appliances	84	80	25	10	3	12.50	0
(21) Communications, electronics, and electrical measuring instruments	39	37	15	1	2	2.70	0
(22) Automobiles	47	43	10	13	0	30.23	1
(23) Other transport machinery	18	18	4	3	0	16.67	0
(24) Precision machinery	24	21	7	4	1	19.05	0
(25) Other industries	14	14	5	1	0	7.14	0
(26) Transportation, communications, and public utilities	26	25	1	1	1	4.00	0
(27) Other types of industries	17	17	2	3	0	17.55	0

Comparison of R&D strength with that of U.S. and Europe, after 5 years

By scale of capital	No. of firms surveyed	Frequency (total value)	Japan>U.S.>Europe	Japan>Europe>U.S.	U.S.>Japan>Europe	U.S.>Europe>Japan	Europe>Japan>U.S.
Firms responding	831	782	144	92	31	26	5
Frequency (total value)/Lateral percentage	831	782.00	144	92	31	26	5
(1) ¥1 to 5 billion	308	290	50	41	10	3.45	3
(2) ¥5 to 10 billion	199	186	28	25	12	6.45	0
(3) ¥10 to 50 billion	240	230	51	18	6	2.61	2
(4) ¥50 to 100 billion	45	40	7	3	2	5.00	0
(5) More than ¥100 billion	39	36	8	5	1	2.78	0

Comparison of R&D strength with that of U.S. and Europe, after 5 years

By type of industry	No. of firms surveyed	Frequency (total value)	Europe (U.S.) Japan	Japan (U.S.) Europe	U.S. Japan Europe	Europe Japan U.S.	Japan (U.S.) Europe
Firms responding	831	782	11	112	18	9	70
Frequency (total value)/Lateral percentage	831	782.00	11	112	18	9	70
(1) Agriculture, forestry, and fisheries	5	3	0	0	1	0	0
(2) Mining	4	4	0	0	0	0	0
(3) Construction	82	75	1	22	0	2	6
(4) Food processing	50	46	0	8	0	1	5
(5) Textiles	26	21	0	4	0	0	0
(6) Pulp and paper	19	18	2	2	0	0	0
(7) Printing and publishing	3	3	0	0	0	0	0
(8) Synthetic chemicals	62	57	1	3	4	1	7
(9) Oils, fats, and paints	11	11	0	0	0	0	0
(10) Pharmaceuticals	38	37	0	3	0	0	3
(11) Other chemicals	35	34	1	4	2	0	5
(12) Petroleum and coal products	18	17	0	0	2	0	1
(13) Plastic products	18	18	1	2	0	1	2
(14) Rubber products	6	6	0	1	0	0	0
(15) Ceramics	32	32	0	8	1	0	1
(16) Iron and steel	36	34	0	6	0	0	1
(17) Nonferrous metals	30	29	0	3	3	0	1
(18) Metal products	23	22	1	5	0	0	2
(19) Machinery	64	60	1	9	1	1	3
(20) Electrical machinery and appliances	84	80	1	8	1	0	9
(21) Communications, electronics, and electrical measuring instruments	39	37	1	4	0	0	7
(22) Automobiles	47	43	0	7	0	0	3
(23) Other transport machinery	18	18	0	1	0	0	1
(24) Precision machinery	24	21	0	2	1	0	2
(25) Other industries	14	14	0	3	0	0	1
(26) Transportation, communications, and public utilities	26	25	0	4	0	0	2
(27) Other types of industries	17	17	1	2	1	1	1

Comparison of R&D strength with that of U.S. and Europe, after 5 years

By scale of capital	No. of firms surveyed	Frequency (total value)	Europe (U.S.) Japan	Japan (U.S.) Europe	U.S. Japan Europe	Europe Japan U.S.	Japan (U.S.) Europe
Firms responding	831	782	11	112	18	9	70
Frequency (total value)/Lateral percentage	831	782.00	11	112	18	9	70
(1) ¥1 to 5 billion	308	290	5	41	5	2	25
(2) ¥5 to 10 billion	199	186	2	27	5	2	17
(3) ¥10 to 50 billion	240	230	4	28	6	5	17
(4) ¥50 to 100 billion	45	40	0	11	1	0	3
(5) More than ¥100 billion	39	36	0	5	1	0	8

Comparison of R&D strength with that of U.S. and Europe, after 5 years

By type of industry	No. of firms surveyed	Frequency (total value)	Japan=Europe> U.S.	U.S.=Europe> Japan	Japan=U.S.= Europe	Don't know
Firms responding	831	782	44	28	131	61
Frequency (total value)/Lateral percent	831	782.00	44	5.63	131	16.75
(1) Agriculture, forestry, and fisher	5	3	0	0.00	0	0.00
(2) Mining	4	4	0	0.00	1	25.00
(3) Construction	82	75	1	1.33	8	10.00
(4) Food processing	50	46	2	4.35	9	19.57
(5) Textiles	26	21	2	9.52	3	14.29
(6) Pulp and paper	19	18	1	5.56	6	33.33
(7) Printing and publishing	3	3	0	0.00	0	0.00
(8) Synthetic chemicals	62	57	1	1.75	13	22.81
(9) Oils, fats, and paints	11	11	1	9.09	2	18.18
(10) Pharmaceuticals	38	37	1	2.70	10	27.03
(11) Other chemicals	35	34	1	2.94	8	23.53
(12) Petroleum and coal products	18	17	1	5.88	3	17.65
(13) Plastic products	18	18	0	0.00	2	11.11
(14) Rubber products	6	6	1	16.67	2	33.33
(15) Ceramics	32	32	5	15.63	4	12.50
(16) Iron and steel	36	34	2	5.88	2	5.88
(17) Nonferrous metals	30	29	1	3.45	7	24.14
(18) Metal products	23	22	2	9.09	6	27.27
(19) Machinery	64	60	8	13.33	3	5.00
(20) Electrical machinery and appliances	84	80	1	1.25	15	18.75
(21) Communications, electronics, and electrical measuring instruments	39	37	0	0.00	3	8.11
(22) Automobiles	47	43	4	9.30	2	4.65
(23) Other transport machinery	18	18	2	11.11	4	22.22
(24) Precision machinery	24	21	1	4.76	1	4.76
(25) Other industries	14	14	1	7.14	3	21.43
(26) Transportation, communications, and public utilities	26	25	5	20.00	6	24.00
(27) Other types of industries	17	17	0	0.00	5	29.41

Comparison of R&D strength with that of U.S. and Europe, after 5 years

By scale of capital	No. of firms surveyed	Frequency (total value)	Japan=Europe> U.S.	U.S.=Europe> Japan	Japan=U.S.= Europe	Don't know
Firms responding	831	782	44	28	131	61
Frequency (total value)/Lateral percent	831	782.00	44	5.63	131	16.75
(1) ¥1 to 5 billion	308	290	16	5.52	50	17.24
(2) ¥5 to 10 billion	199	186	13	6.99	27	14.52
(3) ¥10 to 50 billion	240	230	12	5.22	46	20.00
(4) ¥50 to 100 billion	45	40	2	5.00	4	10.00
(5) More than ¥100 billion	39	36	1	2.78	4	11.11

### Future international situation in connection with S&T

### Future international situation in connection with S&T

**Progress will be**

How firms will cope if tense international relations do not disappear

By type of industry	Number firms surveyed	Frequency (total value)	Technology transfer	R&D cooperation	Establishing R&D strong-points overseas	Endeavoring to gain understanding of society in the area	We will not deal with it in any active way
Firms responding	831	647	178	231	76	42	100
Frequency (total value)/Lateral percent	831	647.00	178	231	76	42	100
(1) Agriculture, forestry, and fisher	5	4	0	2	1	0	1
(2) Mining	4	4	0	3	0	0	1
(3) Construction	82	58	13	22.41	2	3.45	16
(4) Food processing	50	33	4	12.12	4	12.12	8
(5) Textiles	26	20	5	25.00	1	5.00	6
(6) Pulp and paper	19	12	2	16.67	4	33.33	3
(7) Printing and publishing	3	2	1	50.00	0	0.00	0
(8) Synthetic chemicals	62	52	12	23.08	3	5.77	7
(9) Oils, fats, and paints	11	5	1	20.00	1	20.00	1
(10) Pharmaceuticals	38	31	3	9.68	7	22.58	2
(11) Other chemicals	35	29	9	31.03	3	10.34	3
(12) Petroleum and coal products	18	11	3	27.27	6	54.55	2
(13) Plastic products	18	15	5	33.33	1	6.67	2
(14) Rubber products	6	5	4	80.00	0	0.00	0
(15) Ceramics	32	18	7	38.89	2	11.11	3
(16) Iron and steel	36	32	11	34.38	1	3.13	5
(17) Nonferrous metals	30	24	6	25.00	8	33.33	4
(18) Metal products	23	18	8	44.44	2	11.11	3
(19) Machinery	64	54	14	25.93	16	28.63	6
(20) Electrical machinery and appliances	84	69	23	33.33	16	23.19	8
(21) Communications, electronics, and electrical measuring instruments	39	39	13	33.33	5	12.82	6
(22) Automobiles	47	44	13	29.55	9	20.45	5
(23) Other transport machinery	18	14	6	42.86	0	0.00	2
(24) Precision machinery	24	20	5	25.00	5	25.00	2
(25) Other industries	14	10	5	50.00	0	0.00	2
(26) Transportation, communications, and public utilities	26	13	0	0.00	0	0.00	1
(27) Other types of industries	17	11	5	45.45	1	9.09	1

How firms will cope if tense international relations do not disappear

By scale of capital	Number firms surveyed	Frequency (total value)	Technology transfer	R&D cooperation	Establishing R&D strong-points overseas	Endeavoring to gain understanding of society in the area	We will not deal with it in any active way
Firms responding	831	647	178	231	76	42	100
Frequency (total value)/Lateral percent	831	647.00	178	231	76	42	100
(1) \$1 to 5 billion	308	224	67	29.91	6	2.68	46
(2) \$5 to 10 billion	199	157	35	22.29	19	12.10	31
(3) \$10 to 50 billion	240	199	64	22.16	31	15.58	21
(4) \$50 to 100 billion	45	37	8	21.62	13	35.14	2
(5) More than \$100 billion	39	30	4	13.33	7	23.33	0



## Question 3

## Technological strength of Asian NIEs in same categories of industry

By type of industry	Numbers firms surveyed	Frequency (total value)	They are now our competitors	Later (after 3-5 years) we think they will become our competitors	They will not become our competitors for a long time (more than 7-8 years)	Other
Firms responding	831	820	95	423	271	31
Frequency (total value)/Lateral percent	831	820.00	95	423	271	31
(1) Agriculture, forestry, and fisher	5	5	1	2	2	0
(2) Mining	4	4	1	2	1	0
(3) Construction	82	81	10	42	25	4
(4) Food processing	50	56	6	28	12	4
(5) Textiles	26	26	8	14	4	0
(6) Pulp and paper	19	19	3	9	7	0
(7) Printing and publishing	3	3	0	3	0	0
(8) Synthetic chemicals	62	62	7	38	15	2
(9) Oils, fats, and paints	11	11	0	6	5	0
(10) Pharmaceuticals	38	37	0	9	26	2
(11) Other chemicals	35	35	2	14	19	0
(12) Petroleum and coal products	18	17	1	9	3	4
(13) Plastic products	18	18	4	12	2	0
(14) Rubber products	6	6	1	4	1	0
(15) Ceramics	32	32	7	11	12	2
(16) Iron and steel	36	36	9	19	7	1
(17) Nonferrous metals	30	30	4	13	7	1
(18) Metal products	23	23	2	14	7	0
(19) Machinery	64	62	3	30	29	0
(20) Electrical machinery and appliances	84	83	12	47	23	1
(21) Communications, electronics, and electrical measuring instruments	39	39	5	25	9	0
(22) Automobiles	47	46	3	26	16	1
(23) Other transport machinery	18	17	1	10	6	0
(24) Precision machinery	24	23	1	11	10	1
(25) Other industries	14	13	2	6	5	0
(26) Transportation, communications, and public utilities	26	25	0	7	12	6
(27) Other types of industries	17	17	2	7	6	2

## Technological strength of Asian NIEs in same categories of industry

By scale of capital	Numbers firms surveyed	Frequency (total value)	They are now our competitors	Later (after 3-5 years) we think they will become our competitors	They will not become our competitors for a long time (more than 7-8 years)	Other
Firms responding	831	820	95	423	271	31
Frequency (total value)/Lateral percent	831	820.00	95	423	271	31
(1) ¥1 to 5 billion	308	303	29	161	100	13
(2) ¥5 to 10 billion	199	197	25	103	65	4
(3) ¥10 to 50 billion	240	237	29	122	80	6
(4) ¥50 to 100 billion	45	45	8	22	13	2
(5) More than ¥100 billion	39	38	4	15	13	6

# IV. State of Globalization of Private Enterprises' R&D Activities

## Question 1.

### State of ownership of overseas R&D strongpoints

By type of industry	Number firms surveyed	Frequency (total value)	Have	Do not have
Firms responding	831	826	117	709
Frequency (total value)/Lateral percent	831	826.00	117	709
(1) Agriculture, forestry, and fisher	5	4	0	4
(2) Mining	4	4	0	4
(3) Construction	82	82	0	82
(4) Food processing	50	50	6	44
(5) Textiles	26	26	1	25
(6) Pulp and paper	19	19	2	17
(7) Printing and publishing	3	3	1	2
(8) Synthetic chemicals	62	62	5	57
(9) Oils, fats, and paints	11	11	3	8
(10) Pharmaceuticals	38	37	13	24
(11) Other chemicals	35	35	6	29
(12) Petroleum and coal products	18	18	1	17
(13) Plastic products	18	18	0	18
(14) Rubber products	6	6	1	5
(15) Ceramics	32	32	3	29
(16) Iron and steel	36	36	2	34
(17) Nonferrous metals	30	29	3	26
(18) Metal products	23	23	2	21
(19) Machinery	64	64	13	51
(20) Electrical machinery and appliances	84	84	19	65
(21) Communications, electronics, and electrical measuring instruments	39	39	8	31
(22) Automobiles	47	46	15	31
(23) Other transport machinery	18	18	2	16
(24) Precision machinery	24	24	8	16
(25) Other industries	14	13	2	11
(26) Transportation, communications, and public utilities	26	26	0	26
(27) Other types of industries	17	17	1	16

### State of ownership of overseas R&D strongpoints

By scale of capital	Number firms surveyed	Frequency (total value)	Have	Do not have
Firms responding	831	826	117	709
Frequency (total value)/Lateral percent	831	826.00	117	709
(1) ¥1 to 5 billion	308	307	14	293
(2) ¥5 to 10 billion	199	198	26	172
(3) ¥10 to 50 billion	240	237	41	196
(4) ¥50 to 100 billion	45	45	22	23
(5) More than ¥100 billion	39	39	14	25

Question 2 When overseas R&D strongpoints were set up--United States

By type of industry	Number firms surveyed	Frequency (total value)	Before 1979	1970-1979	1980-1984	1985-1991	Plan to set up in the future
Firms responding	831	106					
Frequency (total value)/Lateral percent	831	106.00	3	13	13	75	2
			2.83	12.26	12.26	70.75	1.89
(1)Agriculture, forestry, and fisher	5	0	0.00	0.00	0.00	0.00	0.00
(2)Mining	4	0	0.00	0.00	0.00	0.00	0.00
(3)Construction	82	0	0.00	0.00	0.00	0.00	0.00
(4)Food processing	50	2	0.00	0.00	0.00	0.00	0.00
(5)Textiles	26	1	0.00	50.00	0.00	1	0.00
(6)Pulp and paper	19	2	0.00	0.00	0.00	1	0.00
(7)Printing and publishing	3	0	0.00	0.00	0.00	2	0.00
(8)Synthetic chemicals	62	5	0.00	0.00	0.00	0.00	0.00
(9)Oils, fats, and paints	11	3	0.00	0.00	0.00	5	0.00
(10)Pharmaceuticals	38	13	0.00	33.33	0.00	2	0.00
(11)Other chemicals	35	6	0.00	7.69	15.38	9	0.00
(12)Petroleum and coal products	18	1	0.00	0.00	0.00	6	0.00
(13)Plastic products	18	0	0.00	0.00	0.00	1	0.00
(14)Rubber products	6	1	0.00	0.00	0.00	0	0.00
(15)Ceramics	32	2	0.00	0.00	100.00	0	0.00
(16)Iron and steel	36	1	0.00	0.00	0.00	2	0.00
(17)Nonferrous metals	30	4	0.00	0.00	0.00	1	0.00
(18)Metal products	23	1	0.00	0.00	0.00	4	0.00
(19)Machinery	64	11	0.00	0.00	0.00	1	0.00
(20)Electrical machinery and appliances	84	19	0.00	18.18	18.18	6	0.00
(21)Communications, electronics, and electrical measuring instruments	39	6	10.53	15.79	15.79	11	0.00
(22)Automobiles	47	15	6.67	20.00	26.67	7	0.00
(23)Other transport machinery	18	2	0.00	100.00	0.00	0	0.00
(24)Precision machinery	24	8	0.00	0.00	12.50	7	0.00
(25)Other industries	14	2	0.00	0.00	0.00	2	0.00
(26)Transportation, communications, and public utilities	26	0	0.00	0.00	0.00	0	0.00
(27)Other types of industries	17	1	0.00	0.00	0.00	1	0.00

When overseas R&D strongpoints were set up--United States

By scale of capital	Number firms surveyed	Frequency (total value)	Before 1979	1970-1979	1980-1984	1985-1991	Plan to set up in the future
Firms responding	831	106					
Frequency (total value)/Lateral percent	831	106.00	3	13	13	75	2
			2.83	12.26	12.26	70.75	1.89
(1)¥1 to 5 billion	308	12	1	1	0	10	0.00
(2)¥5 to 10 billion	199	22	1	4	3	14	0.00
(3)¥10 to 50 billion	240	40	0	4	5	30	0.00
(4)¥50 to 100 billion	45	20	0	2	3	14	2.50
(5)More than ¥100 billion	39	12	1	2	2	7	5.00
			8.33	16.67	16.67	58.33	0.00

When overseas R&D strongpoints were set up--Western Europe

By type of industry	Number firms surveyed	Frequency (total value)	Before 1979	1970-1979	1980-1984	1985-1991	Plan to set up in the future
Firms responding	831	71	2	6	5	43	15
Frequency (total value)/Lateral percent	831	71.00	2.82	8.45	7.04	60.56	21.13
(1) Agriculture, forestry, and fisher	5	0	0	0	0	0	0
(2) Mining	4	0	0	0	0	0	0
(3) Construction	82	0	0	0	0	0	0
(4) Food processing	50	3	0	0	0	0	0
(5) Textiles	26	0	0	0	0	0	0
(6) Pulp and paper	19	0	0	0	0	0	0
(7) Printing and publishing	3	1	0	0	0	0	0
(8) Synthetic chemicals	62	1	0	0	0	0	0
(9) Oils, fats, and paints	11	1	0	0	0	0	0
(10) Pharmaceuticals	38	10	0	0	0	0	0
(11) Other chemicals	35	4	0	0	0	0	0
(12) Petroleum and coal products	18	0	0	0	0	0	0
(13) Plastic products	18	0	0	0	0	0	0
(14) Rubber products	6	0	0	0	0	0	0
(15) Ceramics	32	1	0	0	0	0	0
(16) Iron and steel	36	1	0	0	0	0	0
(17) Nonferrous metals	30	2	0	0	0	0	0
(18) Metal products	23	2	0	0	0	0	0
(19) Machinery	84	8	0	0	0	0	0
(20) Electrical machinery and appliances	84	15	1	1	1	7	5
(21) Communications, electronics, and electrical measuring instruments	39	5	0	0	0	3	2
(22) Automobiles	47	11	1	1	0	8	1
(23) Other transport machinery	18	1	0	0	0	0	0
(24) Precision machinery	24	4	0	0	0	0	0
(25) Other industries	14	1	0	0	0	0	0
(26) Transportation, communications, and public utilities	26	0	0	0	0	0	0
(27) Other types of industries	17	0	0	0	0	0	0

When overseas R&D strongpoints were set up--Western Europe

By scale of capital	Number firms surveyed	Frequency (total value)	Before 1979	1970-1979	1980-1984	1985-1991	Plan to set up in the future
Firms responding	831	71	2	6	5	43	15
Frequency (total value)/Lateral percent	831	71.00	2.82	8.45	7.04	60.56	21.13
(1) \$1 to 5 billion	308	3	1	0	0	1	1
(2) \$5 to 10 billion	199	15	0	0	0	0	0
(3) \$10 to 50 billion	240	28	0	5	2	14	4
(4) \$50 to 100 billion	45	14	0	1	1	10	7
(5) More than \$100 billion	39	11	1	0	0	9	2

When overseas R&D strongpoints were set up--Asian NIEs

By type of industry	Number firms surveyed	Frequency (total value)	Before 1979	1970-1979	1980-1984	1985-1991	Plan to set up in the future
Firms responding	831	27					
Frequency (total value)/Lateral percent	831	27.00	2	6	3	11	5
			7.41	22.22	11.11	40.74	18.52
(1) Agriculture, forestry, and fisher	5	0	0	0	0	0	0
(2) Mining	4	0	0	0	0	0	0
(3) Construction	82	0	0	0	0	0	0
(4) Food processing	50	2	0	1	1	0	0
(5) Textiles	26	0	0	0	0	0	0
(6) Pulp and paper	19	0	0	0	0	0	0
(7) Printing and publishing	3	0	0	0	0	0	0
(8) Synthetic chemicals	62	1	0	0	0	0	0
(9) Oils, fats, and paints	11	2	0	1	0	1	0
(10) Pharmaceuticals	38	1	0	1	0	1	0
(11) Other chemicals	35	1	1	100.00	0	0	0
(12) Petroleum and coal products	18	0	0	0	0	0	0
(13) Plastic products	18	0	0	0	0	0	0
(14) Rubber products	6	1	0	1	0	0	0
(15) Ceramics	32	0	0	0	0	0	0
(16) Iron and steel	36	0	0	0	0	0	0
(17) Nonferrous metals	30	0	0	0	0	0	0
(18) Metal products	23	1	0	1	0	0	0
(19) Machinery	64	5	1	20.00	0	3	0
(20) Electrical machinery and appliances	84	9	0	0	2	4	3
(21) Communications, electronics, and electrical measuring instruments	39	0	0	0	0	0	0
(22) Automobiles	47	2	0	0	0	1	1
(23) Other transport machinery	18	1	0	0	0	1	0
(24) Precision machinery	24	1	0	0	0	0	1
(25) Other industries	14	0	0	0	0	0	0
(26) Transportation, communications, and public utilities	26	0	0	0	0	0	0
(27) Other types of industries	17	0	0	0	0	0	0

When overseas R&D strongpoints were set up--Asian NIEs

By scale of capital	Number firms surveyed	Frequency (total value)	Before 1979	1970-1979	1980-1984	1985-1991	Plan to set up in the future
Firms responding	831	27					
Frequency (total value)/Lateral percent	831	27.00	2	6	3	11	5
			7.41	22.22	11.11	40.74	18.52
(1) ¥1 to 5 billion	308	2	0	2	0	0	0
(2) ¥5 to 10 billion	199	7	1	3	1	2	0
(3) ¥10 to 50 billion	240	10	0	1	1	7	1
(4) ¥50 to 100 billion	45	5	1	0	0	2	2
(5) More than ¥100 billion	39	3	0	0	1	0	2

Question 3. Reasons for setting up R&D strongpoints overseas--United States

By type of industry	Number firms surveyed	Frequency (total value)	To strengthen technological power of production strongpoints	R&D that copes with overseas needs, R&D for purpose of improving products	To search for technology seeds (securing basic research information)	To promote joint research with universities and firms in other countries	To secure and use superb genius overseas					
Firms responding	831	105										
Frequency (total value)/Lateral percent	831	277.00	40	38.10	79	75.24	48	45.71	27	25.71	33	31.43
(1)Agriculture, forestry, and fisher	5	0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
(2)Mining	4	0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
(3)Construction	82	0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
(4)Food processing	50	9	1	33.33	1	33.33	3	100.00	1	33.33	1	33.33
(5)Textiles	26	3	1	100.00	1	100.00	0	0.00	0	0.00	0	0.00
(6)Pulp and paper	19	5	1	50.00	2	100.00	1	50.00	0	0.00	0	0.00
(7)Printing and publishing	3	0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
(8)Synthetic chemicals	62	10	1	25.00	3	75.00	1	25.00	1	25.00	1	25.00
(9)Oils, fats, and paints	11	6	0	0.00	2	66.67	2	66.67	1	33.33	1	33.33
(10)Pharmaceuticals	38	34	2	16.67	7	58.33	8	66.67	6	50.00	3	25.00
(11)Other chemicals	35	16	4	66.67	4	66.67	2	33.33	2	33.33	0	0.00
(12)Petroleum and coal products	18	3	0	0.00	1	100.00	0	0.00	0	0.00	1	100.00
(13)Plastic products	18	0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
(14)Rubber products	6	3	1	100.00	1	100.00	0	0.00	0	0.00	0	0.00
(15)Ceramics	32	3	0	0.00	1	50.00	1	50.00	0	0.00	0	0.00
(16)Iron and steel	36	3	1	100.00	0	0.00	1	100.00	1	100.00	0	0.00
(17)Nonferrous metals	30	12	2	50.00	3	75.00	2	50.00	1	25.00	3	75.00
(18)Metal products	23	3	1	100.00	1	100.00	0	0.00	0	0.00	1	100.00
(19)Machinery	64	23	4	36.36	7	63.64	2	18.18	3	27.27	1	9.09
(20)Electrical machinery and appliance	84	54	7	36.84	16	84.21	11	57.89	6	31.58	10	52.63
(21)Communications, electronics, and electrical measuring instruments	39	15	2	33.33	4	66.67	4	66.67	1	16.67	3	50.00
(22)Automobiles	47	41	10	66.67	12	80.00	5	33.33	1	6.67	2	13.33
(23)Other transport machinery	18	6	2	100.00	2	100.00	1	50.00	0	0.00	0	0.00
(24)Precision machinery	24	20	0	0.00	8	100.00	2	25.00	2	25.00	4	50.00
(25)Other industries	14	6	0	0.00	2	100.00	1	50.00	1	50.00	2	100.00
(26)Transportation, communications, ar public utilities	26	0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
(27)Other types of industries	17	2	0	0.00	1	100.00	1	100.00	0	0.00	0	0.00

Reasons for setting up R&D strongpoints overseas--United States

Reasons for setting up new strongpoints overseas												
By scale of capital	Number firms surveyed	Frequency (total value)	To strengthen technological power of production strongpoints	R&D that copes with overseas needs, R&D for purpose of improving products		To search for technology seeds (securing basic research information)	To promote joint research with universities and firms in other countries	To secure and use superb genius overseas				
				831	105				277.00	40	38.10	79
Firms responding	831	105										
Frequency (total value)/Lateral percent	831	277.00	40	38.10	79	75.24	48	45.71	27	25.71	33	31.43
(1) ¥1 to 5 billion	308	32	8	66.67	9	75.00	3	25.00	1	8.33	1	8.33
(2) ¥5 to 10 billion	199	52	6	27.27	14	63.64	7	31.82	2	9.09	9	40.91
(3) ¥10 to 50 billion	240	102	11	28.95	30	78.95	22	57.89	14	36.84	10	26.32
(4) ¥50 to 100 billion	45	54	8	40.00	17	85.00	7	35.00	5	25.00	9	45.00
(5) More than ¥100 billion	39	37	7	53.85	9	69.23	9	69.23	5	38.46	4	30.77

# Reasons for setting up R&D strongpoints overseas--United States

By type of industry	Number firms surveyed	Frequency (total value)	To provide stimulus to the entire company	We came to own R&D strongpoints through acquisitions of overseas firms	For affiliated firms to make inroads overseas	In order not to lag behind in the industrial world	To make the name of our firm penetrate in order to facilitate future production, sales
Firms responding	831	105	4	18	5	10	3
Frequency (total value)/lateral percent	831	277.00	3.81	17.14	4.76	9.52	2.86
(1) Agriculture, forestry, and fisher	5	0	0	0	0	0	0
(2) Mining	4	0	0	0	0	0	0
(3) Construction	82	0	0	0	0	0	0
(4) Food processing	50	9	0	0	0	1	0
(5) Textiles	26	3	0	0	0	1	0
(6) Pulp and paper	19	5	0	0	0	0	0
(7) Printing and publishing	3	0	0	0	0	0	0
(8) Synthetic chemicals	62	10	0	0	0	0	0
(9) Oils, fats, and paints	11	6	0	0	0	0	0
(10) Pharmaceuticals	38	34	1	8.33	0	3	1
(11) Other chemicals	35	16	0	0	0	1	0
(12) Petroleum and coal products	18	3	0	0	0	0	0
(13) Plastic products	18	0	0	0	0	0	0
(14) Rubber products	6	3	0	0	0	0	0
(15) Ceramics	32	3	0	0	0	0	0
(16) Iron and steel	36	3	0	0	0	0	0
(17) Nonferrous metals	30	12	0	0	0	0	0
(18) Metal products	23	3	0	0	0	0	0
(19) Machinery	64	23	1	9.09	1	0	0
(20) Electrical machinery and appliances	84	54	0	0	0	1	0
(21) Communications, electronics, and electrical measuring instruments	39	15	0	0	0	0	0
(22) Automobiles	47	41	1	6.67	3	3	0
(23) Other transport machinery	18	6	0	0	0	0	0
(24) Precision machinery	24	20	1	12.50	0	0	1
(25) Other industries	14	6	0	0	0	0	0
(26) Transportation, communications, and public utilities	26	0	0	0	0	0	0
(27) Other types of industries	17	2	0	0	0	0	0

# Reasons for setting up R&D strongpoints overseas--United States

By scale of capital	Number firms surveyed	Frequency (total value)	To provide stimulus to the entire company	We came to own R&D strongpoints through acquisitions of overseas firms	For affiliated firms to make inroads overseas	In order not to lag behind in the industrial world	To make the name of our firm penetrate in order to facilitate future production, sales
Firms responding	831	105	4	18	5	10	3
Frequency (total value)/lateral percent	831	277.00	3.81	17.14	4.76	9.52	2.86
(1) \$1 to 5 billion	308	32	1	8.33	1	1	1
(2) \$5 to 10 billion	199	52	1	4.55	4	3	0
(3) \$10 to 50 billion	240	102	1	2.63	0	5	1
(4) \$50 to 100 billion	45	54	0	0	0	1	1
(5) More than \$100 billion	39	37	1	7.69	0	0	0

# Reasons for setting up R&D strongpoints overseas--Western Europe

By type of industry	Number firms surveyed	Frequency (total value)	To strengthen technological power of production strongpoints	R&D that copes with overseas needs, R&D for purpose of improving products	To search for technology seeds (securing basic research information)	To promote joint research with universities and firms in other countries	To secure and use superb genius overseas
Firms responding	831	56	18	39	25	14	19
Frequency (total value)/Lateral percent	831	144.00	32.14	69.64	44.64	25.00	33.93
(1) Agriculture, forestry, and fishery	5	0	0	0	0	0	0
(2) Mining	4	0	0	0	0	0	0
(3) Construction	82	0	0	0	0	0	0
(4) Food processing	50	5	1	1	50.00	0	0
(5) Textiles	26	0	0	0	0	0	0
(6) Pulp and paper	19	0	0	0	0	0	0
(7) Printing and publishing	3	3	1	1	100.00	0	0
(8) Synthetic chemicals	62	1	0	0	0	0	0
(9) Oils, fats, and paints	11	1	0	1	100.00	0	0
(10) Pharmaceuticals	38	25	0	7	70.00	5	30.00
(11) Other chemicals	35	7	2	3	100.00	0	0
(12) Petroleum and coal products	18	0	0	0	0	0	0
(13) Plastic products	18	0	0	0	0	0	0
(14) Rubber products	6	0	0	0	0	0	0
(15) Ceramics	32	3	0	0	0	1	100.00
(16) Iron and steel	36	2	0	0	0	1	100.00
(17) Nonferrous metals	30	3	0	0	100.00	1	100.00
(18) Metal products	23	3	1	1	100.00	0	0
(19) Machinery	64	16	2	3	42.86	2	28.57
(20) Electrical machinery and appliances	84	30	5	8	50.00	3	42.86
(21) Communications, electronics, and electrical measuring instruments	39	10	1	3	75.00	0	60.00
(22) Automobiles	47	24	4	7	77.78	1	25.00
(23) Other transport machinery	18	3	1	1	100.00	1	22.22
(24) Precision machinery	24	6	0	2	100.00	0	0.00
(25) Other industries	14	2	0	1	100.00	0	50.00
(26) Transportation, communications, and public utilities	26	0	0	0	0	0	0
(27) Other types of industries	17	0	0	0	0	0	0

# Reasons for setting up R&D strongpoints overseas--Western Europe

By scale of capital	Number firms surveyed	Frequency (total value)	To strengthen technological power of production strongpoints	R&D that copes with overseas needs, R&D for purpose of improving products	To search for technology seeds (securing basic research information)	To promote joint research with universities and firms in other countries	To secure and use superb genius overseas
Firms responding	831	56	18	39	25	14	19
Frequency (total value)/Lateral percent	831	144.00	32.14	69.64	44.64	25.00	33.93
(1) ¥1 to 5 billion	308	6	0	1	50.00	1	0.00
(2) ¥5 to 10 billion	199	24	4	9	81.82	0	27.27
(3) ¥10 to 50 billion	240	53	6	14	66.67	6	28.57
(4) ¥50 to 100 billion	45	32	4	9	75.00	3	50.00
(5) More than ¥100 billion	39	29	4	6	60.00	4	40.00



Reasons for setting up R&D strongpoints overseas-- Western Europe

By type of industry	Number firms surveyed	Frequency (total value)	To provide stimulus to the entire company	We came to own R&D strongpoints through acquisitions of overseas firms	For affiliated firms to make inroads overseas	In order not to lag behind the industrial world	To make the name of our firm penetrate in order to facilitate future production, sales
Firms responding	831	56	3	8	4	5	3
Frequency (total value)/Lateral percent	831	144.00	5.36	14.29	7.14	8.93	5.36
(1) Agriculture, forestry, and fisher	5	0	0	0	0	0	0
(2) Mining	4	0	0	0	0	0	0
(3) Construction	82	0	0	0	0	0	0
(4) Food processing	50	5	0	0	0	1	0
(5) Textiles	25	0	0	0	0	0	0
(6) Pulp and paper	19	0	0	0	0	0	0
(7) Printing and publishing	3	0	0	1	0	0	0
(8) Synthetic chemicals	62	3	0	100.00	0	0	0
(9) Oils, fats, and paints	11	1	0	0	0	0	0
(10) Pharmaceuticals	38	25	1	10.00	0	0	0
(11) Other chemicals	35	7	0	66.67	0	0	0
(12) Petroleum and coal products	18	0	0	0	0	0	0
(13) Plastic products	18	0	0	0	0	0	0
(14) Rubber products	6	0	0	0	0	0	0
(15) Ceramics	32	3	0	0	100.00	0	0
(16) Iron and steel	35	2	1	100.00	0	0	0
(17) Nonferrous metals	30	3	0	0	0	0	0
(18) Metal products	23	3	0	0	0	0	0
(19) Machinery	64	16	0	14.29	1	0	1
(20) Electrical machinery and appliances	84	30	0	0	0	0	0
(21) Communications, electronics, and electrical measuring instruments	39	10	0	50.00	0	0	0
(22) Automobiles	47	24	1	11.11	1	1	0
(23) Other transport machinery	18	3	0	0	0	0	0
(24) Precision machinery	24	6	0	50.00	1	0	0
(25) Other industries	14	2	0	0	0	0	0
(26) Transportation, communications, and public utilities	25	0	0	0	0	0	0
(27) Other types of industries	17	0	0	0	0	0	0

Reasons for setting up R&D strongpoints overseas-- Western Europe

By scale of capital	Number firms surveyed	Frequency (total value)	To provide stimulus to the entire company	We came to own R&D strongpoints through acquisitions of overseas firms	For affiliated firms to make inroads overseas	In order not to lag behind the industrial world	To make the name of our firm penetrate in order to facilitate future production, sales
Firms responding	831	56	3	8	4	5	3
Frequency (total value)/Lateral percent	831	144.00	5.36	14.29	7.14	8.93	5.36
(1) ¥1 to 5 billion	308	6	0	0	0	1	0
(2) ¥5 to 10 billion	199	24	0	1	2	0	1
(3) ¥10 to 50 billion	240	53	1	4.76	2	3	2
(4) ¥50 to 100 billion	45	32	0	0	0	1	0
(5) More than ¥100 billion	39	29	2	20.00	0	0	0

Reasons for setting up R&D strongpoints overseas--Asian MIEs

By type of industry	Number firms surveyed	Frequency (total value)	To strengthen technological power of production strongpoints	R&D that copes with overseas needs, R&D for purpose of improving products	To search for technology seeds (securing basic research information)	To promote joint research with universities and firms in other countries	To secure and use superb genius overseas
Firms responding	831	53.00	15	17	3	1	4
Frequency (total value)/lateral percent	831	53.00	15	17	3	1	4
(1) Agriculture, forestry, and fisher	5	0	0	0	0	0	0
(2) Mining	4	0	0	0	0	0	0
(3) Construction	82	0	0	0	0	0	0
(4) Food processing	50	6	2	2	1	0	0
(5) Textiles	26	0	0	0	0	0	0
(6) Pulp and paper	19	0	0	0	0	0	0
(7) Printing and publishing	3	0	0	0	0	0	0
(8) Synthetic chemicals	62	3	0	1	0	0	0
(9) Oils, fats, and paints	11	5	2	2	1	0	0
(10) Pharmaceuticals	38	2	2	2	0	0	0
(11) Other chemicals	35	5	2	2	0	0	0
(12) Petroleum and coal products	18	0	0	0	0	0	0
(13) Plastic products	18	0	0	0	0	0	0
(14) Rubber products	6	3	1	1	0	0	0
(15) Ceramics	32	0	0	0	0	0	0
(16) Iron and steel	36	0	0	0	0	0	0
(17) Nonferrous metals	30	0	0	0	0	0	0
(18) Metal products	23	2	1	1	0	0	0
(19) Machinery	64	9	2	4	1	1	4
(20) Electrical machinery and appliances	84	15	4	4	0	1	56.57
(21) Communications, electronics, and electrical measuring instruments	39	0	0	0	0	0	0
(22) Automobiles	47	3	1	1	0	0	0
(23) Other transport machinery	18	0	0	0	0	0	0
(24) Precision machinery	24	0	0	0	0	0	0
(25) Other industries	14	0	0	0	0	0	0
(26) Transportation, communications, and public utilities	26	0	0	0	0	0	0
(27) Other types of industries	17	0	0	0	0	0	0

Reasons for setting up R&D strongpoints overseas--Asian MIEs

By scale of capital	Number firms surveyed	Frequency (total value)	To strengthen technological power of production strongpoints	R&D that copes with overseas needs, R&D for purpose of improving products	To search for technology seeds (securing basic research information)	To promote joint research with universities and firms in other countries	To secure and use superb genius overseas
Firms responding	831	53.00	15	17	3	1	4
Frequency (total value)/lateral percent	831	53.00	15	17	3	1	4
(1) ¥1 to 5 billion	308	5	2	2	0	0	0
(2) ¥5 to 10 billion	199	15	6	5	0	0	1
(3) ¥10 to 50 billion	240	19	4	5	3	1	14.29
(4) ¥50 to 100 billion	45	11	3	4	0	0	25.00
(5) More than ¥100 billion	39	3	0	1	0	0	0

Reasons for setting up R&D strongpoints overseas--Asian NIEs

By type of industry	Number firms surveyed	Frequency (total value)	To provide stimulus to the entire company	We came to own R&D strongpoints through acqui- sitions of overseas firms	For affiliated firms to make inroads overseas	In order not to lag behind in the industrial world	To make the name of our firm pene- trate in order to facilitate future production, sales
Firms responding	831	53.00	0	0	0	0	0
Frequency (total value)/Lateral percent	831	53.00	0	0	0	0	0
(1) Agriculture, forestry, and fisher	5	0	0	0	0	0	0
(2) Mining	4	0	0	0	0	0	0
(3) Construction	82	0	0	0	0	0	0
(4) Food processing	50	6	0	1	0	0	0
(5) Textiles	26	0	0	0	0	0	0
(6) Pulp and paper	19	0	0	0	0	0	0
(7) Printing and publishing	3	0	0	0	0	0	0
(8) Synthetic chemicals	62	3	0	1	0	0	1
(9) Oils, fats, and paints	11	5	0	0	1	0	0
(10) Pharmaceuticals	38	2	0	0	0	0	0
(11) Other chemicals	35	5	0	1	0	0	0
(12) Petroleum and coal products	18	0	0	0	0	0	0
(13) Plastic products	18	0	0	0	0	0	0
(14) Rubber products	6	3	0	0	1	0	0
(15) Ceramics	32	0	0	0	0	0	0
(16) Iron and steel	36	0	0	0	0	0	0
(17) Nonferrous metals	30	0	0	0	0	0	0
(18) Metal products	23	2	0	0	0	0	0
(19) Machinery	64	9	0	0	1	2	0
(20) Electrical machinery and appliances	84	15	0	0	1	0	0
(21) Communications, electronics, and electrical measuring instruments	39	0	0	0	0	0	0
(22) Automobiles	47	3	0	0	0	0	0
(23) Other transport machinery	18	0	0	0	0	0	0
(24) Precision machinery	24	0	0	0	0	0	0
(25) Other industries	14	0	0	0	0	0	0
(26) Transportation, communications, ar public utilities	26	0	0	0	0	0	0
(27) Other types of industries	17	0	0	0	0	0	0

Reasons for setting up R&D strongpoints overseas--Asian NIEs

By scale of capital	Number firms surveyed	Frequency (total value)	To provide stimulus to the entire company	We came to own R&D strongpoints through acqui- sitions of overseas firms	For affiliated firms to make inroads overseas	In order not to lag behind in the industrial world	To make the name of our firm pene- trate in order to facilitate future production, sales
Firms responding	831	53.00	0	0	0	0	0
Frequency (total value)/Lateral percent	831	53.00	0	0	0	0	0
(1) ¥1 to 5 billion	308	5	0	1	0	0	0
(2) ¥5 to 10 billion	199	15	0	0	3	0	0
(3) ¥10 to 50 billion	240	19	0	0	1	25	0
(4) ¥50 to 100 billion	45	11	0	2	0	0	25
(5) More than ¥100 billion	39	3	0	0	0	0	0

## Research management problems at R&D strongpoints overseas--Europe and the United States

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# Research management problems at R&D strongpoints overseas--Europe and United States

By type of industry	Number firms surveyed	Frequency (total value)	Frequency (total value)/Lateral percent	Ensuring R&D personnel overseas	Not enough talented people dispatched overseas by our company	High turnover in researchers, and accumulation of technology delayed	Efficient yield of R&D results	Research assessments and other such aspects of research environment are different
Firms responding	831	106						
Frequency (total value)/Lateral percent	831	247.00	31	29.25	26	24.53	6	5.66
(1)Agriculture, forestry, and fisher	5	0	0	0.00	0	0.00	0	0.00
(2)Mining	4	0	0	0.00	0	0.00	0	0.00
(3)Construction	82	0	0	0.00	0	0.00	0	0.00
(4)Food processing	50	11	0	0.00	2	40.00	2	40.00
(5)Textiles	26	3	0	0.00	0	0.00	1	100.00
(6)Pulp and paper	19	4	0	0.00	1	50.00	1	50.00
(7)Printing and publishing	3	3	0	0.00	0	0.00	0	100.00
(8)Synthetic chemicals	62	13	1	20.00	2	40.00	1	20.00
(9)Oils, fats, and paints	11	5	0	0.00	1	50.00	0	0.00
(10)Pharmaceuticals	38	33	4	30.77	3	23.08	2	15.38
(11)Other chemicals	35	18	5	83.33	2	33.33	0	0.00
(12)Petroleum and coal products	18	3	0	0.00	0	0.00	0	0.00
(13)Plastic products	18	0	0	0.00	0	0.00	0	0.00
(14)Rubber products	6	2	0	0.00	0	0.00	0	100.00
(15)Ceramics	32	3	0	0.00	0	0.00	1	50.00
(16)Iron and steel	36	3	0	0.00	1	100.00	0	0.00
(17)Nonferrous metals	30	7	2	50.00	0	0.00	0	0.00
(18)Metal products	23	3	1	100.00	0	0.00	0	0.00
(19)Machinery	64	18	4	10.00	4	40.00	1	10.00
(20)Electrical machinery and appliances	84	35	4	23.53	1	5.88	4	23.53
(21)Communications, electronics, and electrical measuring instruments	39	15	4	50.00	2	25.00	0	0.00
(22)Automobiles	47	37	4	30.77	3	23.08	0	0.00
(23)Other transport machinery	18	5	1	50.00	0	0.00	0	0.00
(24)Precision machinery	24	20	2	25.00	3	37.50	0	12.50
(25)Other industries	14	4	2	100.00	0	0.00	0	0.00
(26)Transportation, communications, and public utilities	26	0	0	0.00	0	0.00	0	0.00
(27)Other types of industries	17	2	0	0.00	1	100.00	0	0.00

# Research management problems at R&D strongpoints overseas--Europe and United States

By scale of capital	Number firms surveyed	Frequency (total value)	Frequency (total value)/Lateral percent	Ensuring R&D personnel overseas	Not enough talented people dispatched overseas by our company	High turnover in researchers, and accumulation of technology delayed	Efficient yield of R&D results	Research assessments and other such aspects of research environment are different
Firms responding	831	106						
Frequency (total value)/Lateral percent	831	247.00	31	29.25	26	24.53	6	5.66
(1)¥1 to 5 billion	308	29	3	25.00	3	25.00	1	8.33
(2)¥5 to 10 billion	199	49	7	31.82	6	27.27	2	9.09
(3)¥10 to 50 billion	240	94	13	32.50	10	25.00	2	5.00
(4)¥50 to 100 billion	45	51	5	22.73	6	27.27	1	4.55
(5)More than ¥100 billion	39	24	3	30.00	1	10.00	0	0.00

Research management problems at R&D strongpoints overseas--Asia

By type of industry	Number firms surveyed	Frequency (total value)	Regulations and systems of the government there	Treatment of intellectual property rights	Expenses are too high	Company's overall strategy on overseas expansion is inadequate	Cooperating with and coming to an understanding with main office in Japan or overseas production site
Firms responding	831	50.00	12	50.00	2	8.33	7
Frequency (total value)/Lateral percent	831	24			1	4.17	29.17
(1)Agriculture, forestry, and fisher	5	0	0	0.00	0	0.00	0
(2)Mining	4	0	0	0.00	0	0.00	0
(3)Construction	82	0	0	0.00	0	0.00	0
(4)Food processing	50	5	2	66.67	0	0.00	1
(5)Textiles	26	0	0	0.00	0	0.00	0
(6)Pulp and paper	19	0	0	0.00	0	0.00	0
(7)Printing and publishing	3	0	0	0.00	0	0.00	0
(8)Synthetic chemicals	62	3	1	100.00	0	0.00	0
(9)Oils, fats, and paints	11	4	0	0.00	0	0.00	1
(10)Pharmaceuticals	38	3	1	100.00	0	0.00	0
(11)Other chemicals	35	8	1	33.33	0	0.00	1
(12)Petroleum and coal products	18	0	0	0.00	0	0.00	2
(13)Plastic products	18	0	0	0.00	0	0.00	0
(14)Rubber products	6	3	1	100.00	0	0.00	0
(15)Ceramics	32	0	0	0.00	0	0.00	0
(16)Iron and steel	36	0	0	0.00	0	0.00	0
(17)Nonferrous metals	30	0	0	0.00	0	0.00	0
(18)Metal products	23	1	0	0.00	0	0.00	0
(19)Machinery	64	11	3	60.00	0	0.00	0
(20)Electrical machinery and appliances	84	7	2	40.00	1	20.00	1
(21)Communications, electronics, and electrical measuring instruments	39	0	0	0.00	0	0.00	0
(22)Automobiles	47	3	0	0.00	0	0.00	0
(23)Other transport machinery	18	2	1	100.00	0	0.00	1
(24)Precision machinery	24	0	0	0.00	0	0.00	0
(25)Other industries	14	0	0	0.00	0	0.00	0
(26)Transportation, communications, and public utilities	26	0	0	0.00	0	0.00	0
(27)Other types of industries	17	0	0	0.00	0	0.00	0

Research management problems at R&D strongpoints overseas--Asia

By scale of capital	Number firms surveyed	Frequency (total value)	Regulations and systems of the government there	Treatment of intellectual property rights	Expenses are too high	Company's overall strategy on overseas expansion is inadequate	Cooperating with and coming to an understanding with main office in Japan or overseas production site
Firms responding	831	50.00	12	50.00	2	8.33	7
Frequency (total value)/Lateral percent	831	24			1	4.17	29.17
(1)¥1 to 5 billion	308	4	2	100.00	0	0.00	1
(2)¥5 to 10 billion	199	18	2	25.00	0	0.00	2
(3)¥10 to 50 billion	240	16	6	66.67	1	11.11	2
(4)¥50 to 100 billion	45	11	2	50.00	0	0.00	2
(5)More than ¥100 billion	39	1	0	0.00	0	0.00	0

# Research management problems at R&D strongpoints overseas--Asia

By type of industry	Not enough talented people dispatched overseas by our company				High turnover in researchers, and accumulation of technology delayed				Efficient yield of R&D results		Research assessments and other such aspects of research environment are different	
	Number firms surveyed	Frequency (total value)	Ensuring R&D personnel overseas									
Firms responding	831	24	7	29.17	9	37.50	3	12.50	4	16.67	2	8.33
Frequency (total value)/Lateral percent	831	50.00										
(1) Agriculture, forestry, and fisher	5	0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
(2) Mining	4	0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
(3) Construction	82	0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
(4) Food processing	50	5	0	0.00	0	0.00	0	0.00	2	66.67	0	0.00
(5) Textiles	26	0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
(6) Pulp and paper	19	0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
(7) Printing and publishing	3	0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
(8) Synthetic chemicals	62	3	0	0.00	0	0.00	0	0.00	1	100.00	0	0.00
(9) Oils, fats, and paints	11	4	0	0.00	2	100.00	1	50.00	0	0.00	0	0.00
(10) Pharmaceuticals	38	3	1	100.00	0	0.00	0	0.00	0	0.00	0	0.00
(11) Other chemicals	35	8	2	66.67	1	33.33	1	33.33	0	0.00	0	0.00
(12) Petroleum and coal products	18	0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
(13) Plastic products	18	0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
(14) Rubber products	6	3	0	0.00	0	0.00	1	100.00	0	0.00	0	0.00
(15) Ceramics	32	0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
(16) Iron and steel	36	0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
(17) Nonferrous metals	30	0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
(18) Metal products	23	1	0	0.00	1	100.00	0	0.00	0	0.00	0	0.00
(19) Machinery	64	11	3	60.00	3	60.00	0	0.00	0	0.00	1	20.00
(20) Electrical machinery and appliances	84	7	1	20.00	1	20.00	0	0.00	0	0.00	1	20.00
(21) Communications, electronics, and electrical measuring instruments	39	0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
(22) Automobiles	47	3	0	0.00	1	100.00	0	0.00	1	100.00	0	0.00
(23) Other transport machinery	18	2	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
(24) Precision machinery	24	0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
(25) Other industries	14	0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
(26) Transportation, communications, and public utilities	26	0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
(27) Other types of industries	17	0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00

# Research management problems at R&D strongpoints overseas--Asia

By scale of capital	Not enough talented people dispatched overseas by our company				High turnover in researchers, and accumulation of technology delayed				Efficient yield of R&D results		Research assessments and other such aspects of research environment are different	
	Number firms surveyed	Frequency (total value)	Ensuring R&D personnel overseas									
Firms responding	831	24	7	29.17	9	37.50	3	12.50	4	16.67	2	8.33
Frequency (total value)/Lateral percent	831	50.00										
(1) ¥1 to 5 billion	308	4	0	0.00	0	0.00	0	0.00	1	50.00	0	0.00
(2) ¥5 to 10 billion	199	18	3	37.50	6	75.00	2	25.00	0	0.00	0	0.00
(3) ¥10 to 50 billion	240	16	3	33.33	1	11.11	0	0.00	1	11.11	1	11.11
(4) ¥50 to 100 billion	45	11	1	25.00	2	50.00	1	25.00	2	50.00	0	0.00
(5) More than ¥100 billion	39	1	0	0.00	0	0.00	0	0.00	0	0.00	1	100.00

Question 5.

Effects of establishing European and U.S. R&D strongpoints on Japanese R&D strongpoints

By type of industry

	Number firms surveyed	Frequency (total value)	Communications with Europe and U.S. will be easier	Information about seeds (technology seeds) will be acquired	It will raise consciousness of researchers	It will inter-nationalize research management	No expectations
Firms responding	831	112	26	62	6	15	0
Frequency (total value)/Lateral percent	831	112.00	26	62	6	15	0
(1)Agriculture, forestry, and fisher	5	0	0	0	0	0	0
(2)Mining	4	0	0	0	0	0	0
(3)Construction	82	0	0	0	0	0	0
(4)Food processing	50	5	0	0	0	0	0
(5)Textiles	26	1	1	4	0	0	0
(6)Pulp and paper	19	1	0	0	0	1	0
(7)Printing and publishing	3	2	1	1	0	0	0
(8)Synthetic chemicals	62	1	1	0	0	0	0
(9)Oils, fats, and paints	11	3	1	4	0	0	0
(10)Pharmaceuticals	38	13	3	3	0	0	0
(11)Other chemicals	35	6	2	6	1	3	0
(12)Petroleum and coal products	18	1	0	1	0	0	0
(13)Plastic products	18	0	0	0	0	0	0
(14)Rubber products	6	1	0	0	0	0	0
(15)Ceramics	32	3	0	2	1	0	0
(16)Iron and steel	36	1	0	0	0	0	0
(17)Nonferrous metals	30	4	0	4	0	1	0
(18)Metal products	23	1	0	1	0	0	0
(19)Machinery	64	11	2	6	0	3	0
(20)Electrical machinery and appliances	84	18	5	8	2	3	0
(21)Communications, electronics, and electrical measuring instruments	39	8	1	4	1	2	0
(22)Automobiles	47	15	5	7	0	2	0
(23)Other transport machinery	18	2	1	1	0	0	0
(24)Precision machinery	24	8	1	6	0	0	0
(25)Other industries	14	2	1	1	0	0	0
(26)Transportation, communications, and public utilities	26	0	0	0	0	0	0
(27)Other types of industries	17	1	1	0	0	0	0

Effects of establishing European and U.S. R&D strongpoints on Japanese R&D strongpoints

	Number firms surveyed	Frequency (total value)	Communications with Europe and U.S. will be easier	Information about seeds (technology seeds) will be acquired	It will raise consciousness of researchers	It will inter-nationalize research management	No expectations
Firms responding	831	112	26	62	6	15	0
Frequency (total value)/Lateral percent	831	112.00	26	62	6	15	0
(1)¥1 to 5 billion	308	12	3	7	1	1	0
(2)¥5 to 10 billion	199	23	3	16	1	1	0
(3)¥10 to 50 billion	240	41	10	24	1	6	0
(4)¥50 to 100 billion	45	22	6	11	0	4	0
(5)More than ¥100 billion	39	14	4	4	3	3	0



## Question 6.

## Content of research at R&amp;D strongpoints overseas, now

By type of industry	Number firms surveyed	Frequency (total value)	Development of products that correspond to market in area	Research for purpose of improving productivity	Research to clear regulations there	Development of what will become core technologies	Basic research
Firms responding	831	116					
Frequency (total value)/Lateral percent	831	189.00	87	75.00	28	24.14	17 14.66 23.28 24 20.69
(1) Agriculture, forestry, and fisher	5	0	0	0.00	0	0.00	0 0.00
(2) Mining	4	0	0	0.00	0	0.00	0 0.00
(3) Construction	82	0	0	0.00	0	0.00	0 0.00
(4) Food processing	50	10	4	66.67	3	50.00	1 16.67
(5) Textiles	26	2	1	100.00	0	0.00	0 0.00
(6) Pulp and paper	19	3	2	100.00	1	50.00	0 0.00
(7) Printing and publishing	3	2	1	100.00	1	100.00	0 0.00
(8) Synthetic chemicals	62	8	5	100.00	1	20.00	0 0.00
(9) Oils, fats, and paints	11	6	3	100.00	0	0.00	2 40.00
(10) Pharmaceuticals	38	18	5	41.67	1	8.33	1 33.33
(11) Other chemicals	35	9	5	83.33	1	16.67	4 33.33
(12) Petroleum and coal products	18	1	0	0.00	0	0.00	2 33.33
(13) Plastic products	18	0	0	0.00	0	0.00	0 0.00
(14) Rubber products	6	2	0	0.00	0	0.00	0 0.00
(15) Ceramics	32	5	2	66.67	1	33.33	0 0.00
(16) Iron and steel	36	2	0	0.00	0	0.00	1 33.33
(17) Nonferrous metals	30	6	3	75.00	0	0.00	0 0.00
(18) Metal products	23	3	2	100.00	1	50.00	0 0.00
(19) Machinery	64	21	10	76.92	6	46.15	0 0.00
(20) Electrical machinery and appliances	84	31	15	78.95	3	15.79	2 15.38
(21) Communications, electronics, and electrical measuring instruments	39	14	5	62.50	1	12.50	3 37.50
(22) Automobiles	47	25	11	73.33	6	40.00	2 13.33
(23) Other transport machinery	18	3	2	100.00	0	0.00	0 0.00
(24) Precision machinery	24	13	8	100.00	1	12.50	0 0.00
(25) Other industries	14	4	2	100.00	0	0.00	1 50.00
(26) Transportation, communications, and public utilities	26	0	0	0.00	0	0.00	0 0.00
(27) Other types of industries	17	1	1	100.00	0	0.00	0 0.00

## Content of research at R&amp;D strongpoints overseas, now

By scale of capital	Number firms surveyed	Frequency (total value)	Development of products that correspond to market in area	Research for purpose of improving productivity	Research to clear regulations there	Development of what will become core technologies	Basic research
Firms responding	831	116					
Frequency (total value)/Lateral percent	831	189.00	87	75.00	28	24.14	17 14.66 23.28 24 20.69
(1) ¥1 to 5 billion	308	23	10	76.92	7	53.85	3 23.08
(2) ¥5 to 10 billion	199	43	21	80.77	7	26.92	3 11.54
(3) ¥10 to 50 billion	240	64	32	78.05	7	17.07	9 21.95
(4) ¥50 to 100 billion	45	34	15	68.18	6	27.27	6 13.64
(5) More than ¥100 billion	39	25	9	64.29	1	7.14	7 42.86

Content of research at R&D strongpoints overseas, after five years

By type of industry	Number firms surveyed	Frequency (total value)	Development of products that correspond to market in area	Research for purpose of improving productivity	Research to clear regulations there	Development of what will become core technologies	Basic research					
Firms responding	831	113										
Frequency (total value)/Lateral percent	831	194.00	82	72.57	21	18.58	14	12.39	52	46.02	22	19.47
(1)Agriculture, forestry, and fisher	5	0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
(2)Mining	4	0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
(3)Construction	82	0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
(4)Food processing	50	11	3	50.00	4	66.67	0	0.00	3	50.00	1	16.67
(5)Textiles	26	2	1	100.00	0	0.00	0	0.00	1	100.00	0	0.00
(6)Pulp and paper	19	3	2	100.00	1	50.00	0	0.00	0	0.00	0	0.00
(7)Printing and publishing	3	2	1	100.00	1	100.00	0	0.00	0	0.00	0	0.00
(8)Synthetic chemicals	62	9	5	100.00	1	20.00	1	20.00	2	40.00	0	0.00
(9)Oils, fats, and paints	11	5	2	66.67	0	0.00	1	33.33	1	33.33	1	33.33
(10)Pharmaceuticals	38	20	8	66.67	1	8.33	2	16.67	4	33.33	4	33.33
(11)Other chemicals	35	10	3	60.00	2	40.00	0	0.00	2	40.00	2	40.00
(12)Petroleum and coal products	18	1	1	100.00	0	0.00	0	0.00	0	0.00	0	0.00
(13)Plastic products	18	0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
(14)Rubber products	6	2	1	100.00	0	0.00	0	0.00	1	100.00	0	0.00
(15)Ceramics	32	5	2	66.67	0	0.00	0	0.00	3	100.00	0	0.00
(16)Iron and steel	36	2	1	100.00	0	0.00	0	0.00	1	100.00	0	0.00
(17)Nonferrous metals	30	6	3	75.00	0	0.00	0	0.00	2	50.00	1	25.00
(18)Metal products	23	3	2	100.00	0	0.00	0	0.00	1	50.00	0	0.00
(19)Machinery	64	22	8	61.54	5	38.46	0	0.00	7	53.85	2	15.38
(20)Electrical machinery and appliances	84	33	16	88.89	2	11.11	2	11.11	8	44.44	5	27.78
(21)Communications, electronics, and electrical measuring instruments	39	14	3	37.50	0	0.00	3	37.50	6	75.00	2	25.00
(22)Automobiles	47	26	11	73.33	4	26.67	3	20.00	4	26.67	3	20.00
(23)Other transport machinery	18	3	2	100.00	0	0.00	1	50.00	0	0.00	0	0.00
(24)Precision machinery	24	13	6	75.00	0	0.00	1	12.50	5	62.50	1	12.50
(25)Other industries	14	1	0	0.00	0	0.00	0	0.00	1	100.00	0	0.00
(26)Transportation, communications, and public utilities	26	0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
(27)Other types of industries	17	1	1	100.00	0	0.00	0	0.00	0	0.00	0	0.00

Content of research at R&D strongpoints overseas, after five years

Content of research at R&D strongpoints overseas, after five years

By scale of capital	Number firms surveyed	Frequency (total value)	Development of products that correspond to market in area	Research for purpose of improving productivity	Research to clear regulations there	Development of what will become core technologies	Basic research					
Firms responding	831	113										
Frequency (total value)/Lateral percent	831	194.00	82	72.57	21	18.58	14	12.39	52	46.02	22	19.47
(1)¥1 to 5 billion	308	24	9	69.23	7	53.85	3	23.08	5	38.46	0	0.00
(2)¥5 to 10 billion	199	42	18	72.00	4	16.00	4	16.00	10	40.00	5	20.00
(3)¥10 to 50 billion	240	66	28	70.00	4	10.00	3	7.50	23	57.50	7	17.50
(4)¥50 to 100 billion	45	37	18	81.82	5	22.73	3	13.64	7	31.82	4	18.18
(5) More than ¥100 billion	39	25	9	69.23	1	7.69	1	7.69	7	53.85	6	46.15

Question 3.

Why some Japanese firms do not establish R&D strongpoints overseas

By type of industry

Firms responding	Frequency (total value)/Lateral percent	Number firms surveyed	Frequency (total value)	R&D strongpoints in Japan are sufficient, and there is no need to establish overseas	R&D overseas is inefficient	Coping with local systems is a lot of trouble	Cannot afford to set up strongpoints overseas	Risk is high
Frequency (total value)/Lateral percent	831	831	698	362	31	15	185	23
(1)Agriculture, forestry, and fisher	5	5	60.00	3	0	0	2	0
(2)Mining	4	4	50.00	2	1	0	1	0
(3)Construction	82	80	72.50	58	4	2	12	1
(4)Food processing	50	44	65.91	29	0	0	11	1
(5)Textiles	26	25	52.00	13	0	0	10	0
(6)Pulp and paper	19	17	76.47	13	0	0	4	0
(7)Printing and publishing	3	1	100.00	1	0	0	0	0
(8)Synthetic chemicals	62	55	38.18	21	2	0	23	1
(9)Oils, fats, and paints	11	8	37.50	3	2	0	2	0
(10)Pharmaceuticals	38	23	8.70	2	1	2	19	2
(11)Other chemicals	35	29	27.59	8	2	0	6	2
(12)Petroleum and coal products	18	16	62.50	10	0	1	2	1
(13)Plastic products	18	17	52.94	9	1	0	4	0
(14)Rubber products	6	5	40.00	2	0	0	3	0
(15)Ceramics	32	29	44.83	13	0	0	11	2
(16)Iron and steel	36	34	70.59	24	0	0	7	1
(17)Nonferrous metals	30	25	40.00	10	2	2	8	1
(18)Metal products	23	21	66.67	14	0	2	3	1
(19)Machinery	64	50	54.00	27	2	0	15	1
(20)Electrical machinery and appliances	84	64	43.75	28	5	2	18	3
(21)Communications, electronics, and electrical measuring instruments	39	31	32.26	10	3	2	6	2
(22)Automobiles	47	32	43.75	14	3	0	8	2
(23)Other transport machinery	18	15	66.67	10	0	1	3	1
(24)Precision machinery	24	15	66.67	10	1	1	2	0
(25)Other industries	14	12	50.00	6	0	0	5	0
(26)Transportation, communications, and public utilities	26	25	64.00	16	0	0	5	0
(27)Other types of industries	17	16	37.50	6	2	0	4	1

By scale of capital

Why some Japanese firms do not establish R&D strongpoints overseas

Firms responding	Frequency (total value)/Lateral percent	Number firms surveyed	Frequency (total value)	R&D strongpoints in Japan are sufficient, and there is no need to establish overseas	R&D overseas is inefficient	Coping with local systems is a lot of trouble	Cannot afford to set up strongpoints overseas	Risk is high
Frequency (total value)/Lateral percent	831	831	698	362	31	15	185	23
(1)¥1 to 5 billion	308	291	54.30	158	11	3	75	11
(2)¥5 to 10 billion	199	169	48.52	82	8	4	55	4
(3)¥10 to 50 billion	240	190	49.47	94	11	7	47	8
(4)¥50 to 100 billion	45	23	56.52	13	0	1	4	0
(5)More than ¥100 billion	39	25	60.00	15	1	0	4	0

## Question 10.

## Technology trade results

By type of industry	Number firms surveyed	Frequency (total value)	Both technology trade imports and exports	Only technology trade exports (value received)	Only technology trade imports (value paid out)	No technology trade
Firms responding	831	813	291	107	124	291
Frequency (total value)/Lateral percent	831	813.00	291	35.79	15.25	35.79
(1) Agriculture, forestry, and fisher	5	5	0	0.00	0	4
(2) Mining	4	4	1	25.00	1	2
(3) Construction	82	78	12	15.38	0	50.00
(4) Food processing	50	50	15	30.00	5	14.10
(5) Textiles	26	25	6	24.00	5	12.00
(6) Pulp and paper	19	19	2	10.53	2	12.00
(7) Printing and publishing	3	3	3	100.00	0	0.00
(8) Synthetic chemicals	62	60	22	35.67	7	11.67
(9) Oils, fats, and paints	11	11	5	45.45	2	18.18
(10) Pharmaceuticals	38	35	22	62.86	1	2.86
(11) Other chemicals	35	35	12	34.29	2	5.71
(12) Petroleum and coal products	18	17	6	35.29	0	0.00
(13) Plastic products	18	17	7	41.18	1	5.88
(14) Rubber products	6	6	3	50.00	0	0.00
(15) Ceramics	32	31	9	29.03	5	16.13
(16) Iron and steel	36	35	12	34.29	8	22.86
(17) Nonferrous metals	30	30	11	36.67	5	16.67
(18) Metal products	23	23	5	21.74	6	26.09
(19) Machinery	64	64	32	50.00	5	7.81
(20) Electrical machinery and appliances	84	82	33	40.24	15	18.29
(21) Communications, electronics, and electrical measuring instruments	39	38	12	31.58	7	18.42
(22) Automobiles	47	47	30	63.83	7	14.89
(23) Other transport machinery	18	18	7	38.89	5	27.78
(24) Precision machinery	24	23	10	43.48	1	4.35
(25) Other industries	14	14	5	35.71	2	14.29
(26) Transportation, communications, and public utilities	26	26	4	15.38	0	0.00
(27) Other types of industries	17	17	5	29.41	1	5.88
					3	17.65
					8	47.06

## Technology trade results

## By scale of capital

By scale of capital	Number firms surveyed	Frequency (total value)	Both technology trade imports and exports	Only technology trade exports (value received)	Only technology trade imports (value paid out)	No technology trade
Firms responding	831	813	291	107	124	291
Frequency (total value)/Lateral percent	831	813.00	291	35.79	15.25	35.79
(1) \$1 to 5 billion	308	306	65	21.24	51	16.67
(2) \$5 to 10 billion	199	195	52	26.67	35	17.95
(3) \$10 to 50 billion	240	229	119	51.97	27	11.79
(4) \$50 to 100 billion	45	45	29	64.44	8	17.78
(5) More than \$100 billion	39	38	26	68.42	3	7.89

# Proportions of technology export destination

By type of industry	Number firms surveyed	Frequency (total value)	Subsidiaries only	Mostly subsidiaries	About the same for subsidiaries and non-subsidiaries	Mostly nonsubsidiaries	Only nonsubsidiaries
Firms responding	831	402	31	63	27	108	173
Frequency (total value)/Lateral percent	831	402.00	31	63	27	108	173
(1) Agriculture, forestry, and fisher	5	1	0	0	1	0	0
(2) Mining	4	1	0	0	0	0	1
(3) Construction	82	20	0	0	4	7	9
(4) Food processing	50	23	4	3	0	7	9
(5) Textiles	26	12	0	2	3	1	6
(6) Pulp and paper	19	6	1	1	0	1	3
(7) Printing and publishing	3	3	0	0	0	0	3
(8) Synthetic chemicals	62	30	0	2	2	11	15
(9) Oils, fats, and paints	11	7	0	1	0	3	3
(10) Pharmaceuticals	38	23	0	3	0	6	14
(11) Other chemicals	35	14	3	3	0	3	5
(12) Petroleum and coal products	18	6	0	0	0	1	5
(13) Plastic products	18	8	1	2	1	2	2
(14) Rubber products	6	6	0	3	1	1	1
(15) Ceramics	32	15	0	2	1	5	7
(16) Iron and steel	36	21	0	0	2	8	11
(17) Nonferrous metals	30	16	1	4	0	4	7
(18) Metal products	23	11	2	2	0	1	6
(19) Machinery	64	37	3	6	0	9	19
(20) Electrical machinery and appliances	84	48	8	9	4	14	13
(21) Communications, electronics, and electrical measuring instruments	39	18	4	8	1	0	3
(22) Automobiles	47	37	2	8	2	11	14
(23) Other transport machinery	18	11	0	1	2	5	3
(24) Precision machinery	24	11	2	2	0	4	3
(25) Other industries	14	7	0	0	2	2	3
(26) Transportation, communications, and public utilities	26	4	0	0	0	1	3
(27) Other types of industries	17	6	0	1	1	1	3

# Proportions of technology export destination

By scale of capital	Number firms surveyed	Frequency (total value)	Subsidiaries only	Mostly subsidiaries	About the same for subsidiaries and non-subsidiaries	Mostly nonsubsidiaries	Only nonsubsidiaries
Firms responding	831	402	31	63	27	108	173
Frequency (total value)/Lateral percent	831	402.00	31	63	27	108	173
(1) ¥1 to 5 billion	308	106	11	11	5	22	57
(2) ¥5 to 10 billion	199	94	9	14	11	16	44
(3) ¥10 to 50 billion	240	147	10	19	8	51	59
(4) ¥50 to 100 billion	45	29	1	9	3	10	6
(5) More than ¥100 billion	39	26	0	10	0	9	7

## Question 11.

## Relative importance of Asian NIEs

By type of industry	Number firms surveyed	Frequency (total value)	Not important as R&D strongpoints	Product development strongpoints (including production support)	R&D strongpoints for important technology	Basic research strongpoints of Asian NIEs	Strongpoints for joint research with research organizations, and firms of Asian NIEs
Firms responding	831	806					
Frequency (total value)/Lateral percent	831	902.00	576	239	15	7	28
(1) Agriculture, forestry, and fisher	5	4	2	2	0	0	0
(2) Mining	4	5	3	1	0	0	0
(3) Construction	82	82	70	12	1	2	3
(4) Food processing	50	57	26	23	2	0	1
(5) Textiles	26	28	19	6	0	0	1
(6) Pulp and paper	19	21	18	2	0	1	0
(7) Printing and publishing	3	4	1	1	0	0	0
(8) Synthetic chemicals	62	67	39	19	1	1	1
(9) Oils, fats, and paints	11	13	6	7	0	0	0
(10) Pharmaceuticals	38	39	21	13	0	0	0
(11) Other chemicals	35	39	24	12	1	1	1
(12) Petroleum and coal products	18	18	11	4	0	0	0
(13) Plastic products	18	21	16	3	0	0	0
(14) Rubber products	6	7	3	4	0	0	0
(15) Ceramics	32	34	21	11	1	0	0
(16) Iron and steel	36	39	28	11	0	0	0
(17) Nonferrous metals	30	36	23	9	0	0	0
(18) Metal products	23	27	19	7	1	0	0
(19) Machinery	64	70	47	19	1	0	1
(20) Electrical machinery and appliances	84	94	52	31	4	2	3
(21) Communications, electronics, and electrical measuring instruments	39	45	28	14	0	0	3
(22) Automobiles	47	48	32	14	0	0	0
(23) Other transport machinery	18	21	14	6	0	0	1
(24) Precision machinery	24	26	15	9	0	0	2
(25) Other industries	14	14	10	4	0	0	0
(26) Transportation, communications, and public utilities	26	25	19	2	0	0	1
(27) Other types of industries	17	18	9	3	3	0	1

## Relative importance of Asian NIEs

By scale of capital	Number firms surveyed	Frequency (total value)	Not important as R&D strongpoints	Product development strongpoints (including production support)	R&D strongpoints for important technology	Basic research strongpoints of Asian NIEs	Strongpoints for joint research with research organizations, and firms of Asian NIEs
Firms responding	831	806					
Frequency (total value)/Lateral percent	831	902.00	576	239	15	7	28
(1) ¥1 to 5 billion	308	335	223	79	5	4	10
(2) ¥5 to 10 billion	199	209	146	49	2	2	5
(3) ¥10 to 50 billion	240	270	153	88	6	1	8
(4) ¥50 to 100 billion	45	49	29	16	0	0	0
(5) More than ¥100 billion	39	39	25	7	2	0	1

Question 12. Contributions made, research commissioned to universities overseas

By type of industry	Number firms surveyed	Frequency (total value)	Nothing at all	Less than ¥1 million	¥1 million or more	¥5 million or more	¥10 million or more
Firms responding	831	655	497	10	47	28	58
Frequency (total value)/Lateral percent	831	655.00	497	10	47	28	58
(1) Agriculture, forestry, and fisher	5	4	4	0	0	0	0
(2) Mining	4	3	2	0	1	0	0
(3) Construction	82	59	51	0	33.33	0	0
(4) Food processing	50	41	27	0	3.39	1	2
(5) Textiles	25	22	18	1	21.95	2	3
(6) Pulp and paper	19	14	12	0	0.00	1	2
(7) Printing and publishing	3	3	2	0	7.14	0	1
(8) Synthetic chemicals	62	49	35	0	0.00	1	0
(9) Oils, fats, and paints	11	7	7	1	33.33	2	0
(10) Pharmaceuticals	38	32	14	0	6.12	1	7
(11) Other chemicals	35	29	17	1	4.08	2	14.29
(12) Petroleum and coal products	18	16	10	1	10.00	1	0
(13) Plastic products	18	13	12	0	12.50	3	9
(14) Rubber products	5	5	4	0	6.90	2	28.13
(15) Ceramics	32	22	19	0	12.50	2	6
(16) Iron and steel	36	27	24	0	7.69	0	0
(17) Nonferrous metals	30	23	20	0	0.00	0	0
(18) Metal products	23	17	17	0	0.00	0	0
(19) Machinery	64	55	45	1	4.35	1	3.70
(20) Electrical machinery and appliances	84	58	40	2	0.00	0	0
(21) Communications, electronics, and electrical measuring instruments	39	30	23	0	3.64	3	5.45
(22) Automobiles	47	39	30	1	6.90	3	13.79
(23) Other transport machinery	18	17	12	0	0.00	2	10.00
(24) Precision machinery	24	22	13	0	7.69	1	5.13
(25) Other industries	14	12	10	0	17.65	0	11.76
(26) Transportation, communications, and public utilities	25	21	17	0	13.64	2	13.64
(27) Other types of industries	17	12	12	0	8.33	0	8.33
					4.76	1	9.52
					0.00	0	0.00

Contributions made, research commissioned to universities overseas

By scale of capital	Number firms surveyed	Frequency (total value)	Nothing at all	Less than ¥1 million	¥1 million or more	¥5 million or more	¥10 million or more
Firms responding	831	655	497	10	47	28	58
Frequency (total value)/Lateral percent	831	655.00	497	10	47	28	58
(1) ¥1 to 5 billion	308	235	228	2	1.28	1	0.43
(2) ¥5 to 10 billion	199	153	127	2	8.50	6	3.27
(3) ¥10 to 50 billion	240	196	117	6	13.27	14	29
(4) ¥50 to 100 billion	45	37	9	0	5.41	5	16
(5) More than ¥100 billion	39	34	16	0	8.82	2	7

Contributions made, research commissioned to universities overseas

By type of industry	Number firms surveyed	Frequency (total value)	¥100 million or more
Firms responding	831	655	15
Frequency (total value)/Lateral percent	831	655.00	15
(1) Agriculture, forestry, and fisher	5	4	0
(2) Mining	4	3	0
(3) Construction	82	59	3
(4) Food processing	50	41	0
(5) Textiles	26	22	0
(6) Pulp and paper	19	14	0
(7) Printing and publishing	3	3	0
(8) Synthetic chemicals	62	49	1
(9) Oils, fats, and paints	11	10	0
(10) Pharmaceuticals	38	32	1
(11) Other chemicals	35	29	1
(12) Petroleum and coal products	18	16	0
(13) Plastic products	18	13	0
(14) Rubber products	6	5	0
(15) Ceramics	32	22	0
(16) Iron and steel	36	27	1
(17) Nonferrous metals	30	23	1
(18) Metal products	23	17	0
(19) Machinery	64	55	1
(20) Electrical machinery and appliance	84	58	1
(21) Communications, electronics, and electrical measuring instruments	39	30	2
(22) Automobiles	47	39	2
(23) Other transport machinery	18	17	0
(24) Precision machinery	24	22	1
(25) Other industries	14	12	0
(26) Transportation, communications, and public utilities	26	21	0
(27) Other types of industries	17	12	0

Contributions made, research commissioned to universities overseas

By scale of capital	Number firms surveyed	Frequency (total value)	¥100 million or more
Firms responding	831	655	15
Frequency (total value)/Lateral percent	831	655.00	15
(1) ¥1 to 5 billion	308	235	0
(2) ¥5 to 10 billion	199	153	0
(3) ¥10 to 50 billion	240	196	4
(4) ¥50 to 100 billion	45	37	5
(5) More than ¥100 billion	39	34	6



Contributions made, research commissioned to universities in Japan

By type of industry	Number firms surveyed	Frequency (total value)	Nothing at all	Less than ¥1 million	¥1 million or more	¥5 million or more	¥10 million or more
Firms responding	831	783	185	95	183	93	185
Frequency (total value)/Lateral percent	831	783.00	185	23.63	183	93	23.63
(1) Agriculture, forestry, and fisher	5	4	1	25.00	0	0.00	25.00
(2) Mining	4	4	1	0.00	2	50.00	0.00
(3) Construction	82	76	18	7.89	21	27.63	30.26
(4) Food processing	50	46	12	26.09	9	19.57	30.43
(5) Textiles	26	25	11	4.00	6	8.00	16.00
(6) Pulp and paper	19	15	7	46.67	4	26.67	13.33
(7) Printing and publishing	3	3	0	0.00	0	0.00	66.67
(8) Synthetic chemicals	62	58	17	29.31	8	13.79	29.31
(9) Oils, fats, and paints	11	11	5	45.45	2	18.18	18.18
(10) Pharmaceuticals	38	37	2	5.41	1	2.70	45.95
(11) Other chemicals	35	30	5	16.67	8	26.67	36.67
(12) Petroleum and coal products	18	17	2	11.76	2	11.76	47.06
(13) Plastic products	18	17	2	11.76	5	29.41	17.65
(14) Rubber products	6	6	2	33.33	1	16.67	16.67
(15) Ceramics	32	29	7	24.14	10	34.48	10.34
(16) Iron and steel	36	34	8	23.53	6	17.65	14.71
(17) Nonferrous metals	30	30	10	33.33	6	20.00	20.00
(18) Metal products	23	22	6	27.27	9	40.91	0.00
(19) Machinery	64	63	17	26.98	14	22.22	15.87
(20) Electrical machinery and appliances	84	79	14	17.72	23	29.11	24.05
(21) Communications, electronics, and electrical measuring instruments	39	39	7	17.95	11	28.21	10.26
(22) Automobiles	47	44	11	25.00	8	18.18	25.00
(23) Other transport machinery	18	18	4	22.22	6	33.33	5.56
(24) Precision machinery	24	22	4	18.18	8	36.36	27.27
(25) Other industries	14	14	3	21.43	4	28.57	14.29
(26) Transportation, communications, and public utilities	26	24	4	16.67	2	8.33	41.67
(27) Other types of industries	17	16	5	31.25	6	37.50	18.75

Contributions made, research commissioned to universities in Japan

By scale of capital

By scale of capital	Number firms surveyed	Frequency (total value)	Nothing at all	Less than ¥1 million	¥1 million or more	¥5 million or more	¥10 million or more
Firms responding	831	783	185	95	183	93	185
Frequency (total value)/Lateral percent	831	783.00	185	23.63	183	93	23.63
(1) ¥1 to 5 billion	308	291	116	39.86	75	25.77	8.25
(2) ¥5 to 10 billion	199	188	48	25.53	54	28.72	15.43
(3) ¥10 to 50 billion	240	229	19	8.30	49	21.40	39.74
(4) ¥50 to 100 billion	45	41	2	4.88	5	12.20	56.10
(5) More than ¥100 billion	39	34	0	0.00	0	0.00	52.94

Contributions made, research commissioned to universities  
in Japan

By type of industry	Number firms surveyed	Frequency (total value)	¥100 million or more
Firms responding	831	783	42
Frequency (total value)/Lateral percent	831	783.00	42 5.36
(1) Agriculture, forestry, and fisher	5	4	0 0.00
(2) Mining	4	4	0 0.00
(3) Construction	82	76	3 3.95
(4) Food processing	50	46	2 4.35
(5) Textiles	26	25	1 4.00
(6) Pulp and paper	19	15	0 0.00
(7) Printing and publishing	3	3	0 0.00
(8) Synthetic chemicals	62	58	6 10.34
(9) Oils, fats, and paints	11	11	0 0.00
(10) Pharmaceuticals	38	37	12 32.43
(11) Other chemicals	35	30	1 3.33
(12) Petroleum and coal products	18	17	0 0.00
(13) Plastic products	18	17	0 0.00
(14) Rubber products	6	6	0 0.00
(15) Ceramics	32	29	0 0.00
(16) Iron and steel	36	34	3 8.82
(17) Nonferrous metals	30	30	0 0.00
(18) Metal products	23	22	0 0.00
(19) Machinery	64	63	2 3.17
(20) Electrical machinery and appliances	84	79	3 3.80
(21) Communications, electronics, and electrical measuring instruments	39	39	3 7.69
(22) Automobiles	47	44	0 0.00
(23) Other transport machinery	18	18	1 5.56
(24) Precision machinery	24	22	0 0.00
(25) Other industries	14	14	0 0.00
(26) Transportation, communications, ar public utilities	26	24	5 20.83
(27) Other types of industries	17	16	0 0.00

Contributions made, research commissioned to universities  
in Japan

By scale of capital	Number firms surveyed	Frequency (total value)	¥100 million or more
Firms responding	831	783	42
Frequency (total value)/Lateral percent	831	783.00	42 5.36
(1) ¥1 to 5 billion	308	291	3 1.03
(2) ¥5 to 10 billion	199	188	2 1.06
(3) ¥10 to 50 billion	240	229	16 6.99
(4) ¥50 to 100 billion	45	41	7 17.07
(5) More than ¥100 billion	39	34	14 41.18

## Question 14.

## Ultimate image of international expansion of R&amp;D

By type of industry	Number of firms surveyed	Frequency (total value)	Frequency (total value)/Lateral percent	R&D strongpoints in Japan, the U.S. in Japan and only in Japan, but to companies and supplemental R&D aim for composite clients; not image of independence	Core R&D functions	It goes according to companies and clients; not image of independence	Do not intend to inter-nationally expand R&D
Firms responding	831	800	76	191	168	60	274
Frequency (total value)/Lateral percent	831	800.00	76	191	168	60	274
(1) Agriculture, forestry, and fisher	5	4	0	0	0	1	2
(2) Mining	4	4	1	25.00	1	25.00	1
(3) Construction	82	79	6	7.59	16	8.86	39
(4) Food processing	50	47	5	10.64	16	34.04	18
(5) Textiles	26	25	1	4.00	5	20.00	12
(6) Pulp and paper	19	19	0	0.00	2	10.53	11
(7) Printing and publishing	3	3	0	0.00	1	33.33	0
(8) Synthetic chemicals	62	60	4	6.67	15	25.00	22
(9) Oils, fats, and paints	11	9	1	11.11	3	33.33	4
(10) Pharmaceuticals	38	37	7	18.92	14	37.84	4
(11) Other chemicals	35	35	7	20.00	5	14.29	2
(12) Petroleum and coal products	18	17	0	0.00	6	35.29	5
(13) Plastic products	18	18	3	16.67	4	22.22	7
(14) Rubber products	6	6	0	0.00	1	16.67	2
(15) Ceramics	32	31	2	6.45	8	25.81	13
(16) Iron and steel	36	34	1	2.94	4	11.76	17
(17) Nonferrous metals	30	28	4	14.29	4	14.29	10
(18) Metal products	23	23	2	8.70	4	17.39	10
(19) Machinery	64	63	6	9.52	16	25.40	23
(20) Electrical machinery and appliances	84	82	10	12.20	19	23.17	23
(21) Communications, electronics, and electrical measuring instruments	39	39	4	10.26	9	23.08	12
(22) Automobiles	47	45	3	6.67	15	33.33	7
(23) Other transport machinery	18	18	2	11.11	4	22.22	7
(24) Precision machinery	24	23	2	8.70	6	26.09	5
(25) Other industries	14	14	1	7.14	4	28.57	2
(26) Transportation, communications, and public utilities	26	20	1	5.00	2	10.00	12
(27) Other types of industries	17	17	3	17.65	7	41.18	4

## Ultimate image of international expansion of R&amp;D

By scale of capital	Number of firms surveyed	Frequency (total value)	Frequency (total value)/Lateral percent	R&D strongpoints in Japan, the U.S. in Japan and only in Japan, but to companies and supplemental R&D aim for composite clients; not image of independence	Core R&D functions	It goes according to companies and clients; not image of independence	Do not intend to inter-nationally expand R&D
Firms responding	831	800	76	191	168	60	274
Frequency (total value)/Lateral percent	831	800.00	76	191	168	60	274
(1) ¥1 to 5 billion	308	298	24	8.05	53	17.79	137
(2) ¥5 to 10 billion	199	188	18	9.57	54	28.72	71
(3) ¥10 to 50 billion	240	232	21	9.05	72	31.03	50
(4) ¥50 to 100 billion	45	44	8	18.18	8	18.18	6
(5) More than ¥100 billion	39	38	5	13.16	4	10.53	10

# U. State of Globalization of R&D Strongpoints in Japan

## Question 2. Future target percentages of non-Japanese researchers at R&D strongpoints in Japan

By type of industry	Number firms surveyed	Frequency (total value)	0%	About 1%	About 2%	About 4%	About 6%
Firms responding	831	765	161	46	34	21	16
Frequency (total value)/Lateral percent	831	765.00	161	21.05	34	2.75	2.09
(1) Agriculture, forestry, and fisher	5	3	0	1	1	0	0
(2) Mining	4	4	1	0	0	0	0
(3) Construction	82	77	16	2	2	1	0
(4) Food processing	50	44	14	3	2	1	3
(5) Textiles	26	25	7	1	1	0	1
(6) Pulp and paper	19	15	4	4	2	1	0
(7) Printing and publishing	3	3	1	4	0	0	0
(8) Synthetic chemicals	62	55	5	0	0	1	0
(9) Oils, fats, and paints	11	10	3	1	1	1	0
(10) Pharmaceuticals	38	35	2	1	0	1	0
(11) Other chemicals	35	35	7	5	3	0	0
(12) Petroleum and coal products	18	16	2	3	3	1	0
(13) Plastic products	18	17	4	3	0	0	0
(14) Rubber products	6	5	0	1	1	0	0
(15) Ceramics	32	29	14	0	0	0	1
(16) Iron and steel	36	33	14	0	3	0	0
(17) Nonferrous metals	30	29	5	2	2	0	1
(18) Metal products	23	21	4	1	0	0	2
(19) Machinery	64	62	17	1	0	0	0
(20) Electrical machinery and appliances	84	76	11	4	5	5	2
(21) Communications, electronics, and electrical measuring instruments	39	37	3	3	4	1	2
(22) Automobiles	47	45	7	1	2	1	1
(23) Other transport machinery	18	16	2	1	2	0	0
(24) Precision machinery	24	22	2	2	1	2	0
(25) Other industries	14	14	2	2	3	0	0
(26) Transportation, communications, and public utilities	26	23	10	0	0	0	0
(27) Other types of industries	17	14	4	0	0	1	0

## Future target percentages of non-Japanese researchers at R&D strongpoints in Japan

By scale of capital	Number firms surveyed	Frequency (total value)	0%	About 1%	About 2%	About 4%	About 6%
Firms responding	831	765	161	46	34	21	16
Frequency (total value)/Lateral percent	831	765.00	161	21.05	34	2.75	2.09
(1) ¥1 to 5 billion	308	281	94	13	9	4	3
(2) ¥5 to 10 billion	199	188	37	7	7	5	4
(3) ¥10 to 50 billion	240	218	19	22	13	9	8
(4) ¥50 to 100 billion	45	44	5	2	3	2	1
(5) More than ¥100 billion	39	34	6	2	2	1	0

Future target percentages of non-Japanese researchers at R&D strongpoints in Japan

By type of industry	Number firms surveyed	Frequency (total value)	About 8%	About 10%	About 15%	20% or higher	No target set
Firms responding	831	765	2	17	1	2	465
Frequency (total value)/Lateral percent	831	765.00	2	17	1	2	465
(1) Agriculture, forestry, and fisher	5	3	0	0	0	0	1
(2) Mining	4	4	0	0	0	0	3
(3) Construction	82	77	0	4	0	0	49
(4) Food processing	50	44	0	1	0	0	24
(5) Textiles	26	25	0	0	0	0	14
(6) Pulp and paper	19	15	0	0	0	0	7
(7) Printing and publishing	3	3	0	0	0	0	1
(8) Synthetic chemicals	62	55	1	1	0	0	42
(9) Oils, fats, and paints	11	10	0	0	0	0	5
(10) Pharmaceuticals	38	35	0	0	0	0	28
(11) Other chemicals	35	35	0	0	0	1	20
(12) Petroleum and coal products	18	16	0	0	0	0	11
(13) Plastic products	18	17	0	1	0	0	10
(14) Rubber products	6	5	0	0	0	0	4
(15) Ceramics	32	29	1	0	0	0	11
(16) Iron and steel	36	33	0	1	0	0	13
(17) Nonferrous metals	30	29	0	1	0	0	20
(18) Metal products	23	21	0	0	1	0	15
(19) Machinery	64	62	0	1	0	0	31
(20) Electrical machinery and appliances	84	76	0	1	0	0	51
(21) Communications, electronics, and electrical measuring instruments	39	37	0	2	0	0	21
(22) Automobiles	47	45	0	0	0	0	33
(23) Other transport machinery	18	16	0	1	0	1	10
(24) Precision machinery	24	22	0	2	0	0	13
(25) Other industries	14	14	0	0	0	0	7
(26) Transportation, communications, and public utilities	26	23	0	0	0	0	13
(27) Other types of industries	17	14	0	1	0	0	8

Future target percentages of non-Japanese researchers at R&D strongpoints in Japan

By scale of capital	Number firms surveyed	Frequency (total value)	About 8%	About 10%	About 15%	20% or higher	No target set
Firms responding	831	765	2	17	1	2	465
Frequency (total value)/Lateral percent	831	765.00	2	17	1	2	465
(1) ¥1 to 5 billion	308	281	1	3	0	1	153
(2) ¥5 to 10 billion	199	188	0	5	0	0	123
(3) ¥10 to 50 billion	240	218	1	7	1	1	137
(4) ¥50 to 100 billion	45	44	0	1	0	0	30
(5) More than ¥100 billion	39	34	0	1	0	0	22

# Question 4. Reasons for employing non-Japanese researchers

Reasons for employing non-Japanese researchers												
By type of industry	Number firms surveyed	Frequency (total value)	To develop new technology that is touched off by differences in concepts			To globalize research management	To shore up the lack of talented personnel	Expectations from superb researchers that cannot be expected from Japanese researchers		To build the foundation for setting up overseas in the future		
			51	31.68	44			27.33	64		39.75	30
Firms responding	831	161										
Frequency (total value)/Lateral percent	831	248.00										
(1)Agriculture, forestry, and fisher	5	0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
(2)Mining	4	0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
(3)Construction	82	18	5	45.45	2	18.18	4	36.36	4	36.36	2	18.18
(4)Food processing	50	10	1	12.50	1	12.50	3	37.50	0	0.00	1	12.50
(5)Textiles	26	0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
(6)Pulp and paper	19	2	0	0.00	0	0.00	1	50.00	0	0.00	0	0.00
(7)Printing and publishing	3	0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
(8)Synthetic chemicals	62	21	1	7.14	4	28.57	4	28.57	2	14.29	3	21.43
(9)Oils, fats, and paints	11	1	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
(10)Pharmaceuticals	38	17	5	50.00	3	30.00	2	20.00	4	40.00	1	10.00
(11)Other chemicals	35	10	1	12.50	2	25.00	2	25.00	2	25.00	1	12.50
(12)Petroleum and coal products	18	3	1	50.00	1	50.00	1	50.00	0	0.00	0	0.00
(13)Plastic products	18	0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
(14)Rubber products	6	0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
(15)Ceramics	32	5	1	25.00	0	0.00	2	50.00	0	0.00	0	0.00
(16)Iron and steel	36	10	3	50.00	2	33.33	3	50.00	2	33.33	0	0.00
(17)Nonferrous metals	30	13	2	22.22	2	22.22	9	100.00	0	0.00	0	0.00
(18)Metal products	23	0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
(19)Machinery	64	19	3	21.43	3	21.43	6	42.86	4	28.57	0	0.00
(20)Electrical machinery and appliances	84	46	12	41.38	9	31.03	10	34.48	4	13.79	7	24.14
(21)Communications, electronics, and electrical measuring instruments	39	26	5	31.25	4	25.00	6	37.50	3	18.75	3	18.75
(22)Automobiles	47	13	4	57.14	3	42.86	2	28.57	2	28.57	1	14.29
(23)Other transport machinery	18	8	2	40.00	2	40.00	2	40.00	1	20.00	0	0.00
(24)Precision machinery	24	18	3	30.00	4	40.00	6	60.00	0	0.00	0	0.00
(25)Other industries	14	3	1	50.00	0	0.00	1	50.00	0	0.00	1	50.00
(26)Transportation, communications, ar public utilities	26	2	1	100.00	1	100.00	0	0.00	0	0.00	0	0.00
(27)Other types of industries	17	3	0	0.00	1	50.00	0	0.00	1	50.00	0	0.00

## Reasons for employing non-Japanese researchers

Reasons for employing non-Japanese researchers												
By scale of capital	Number firms surveyed	Frequency (total value)	To develop new technology that is touched off by differences in concepts			To globalize research management	To shore up the lack of talented personnel	Expectations from superb researchers that cannot be expected from Japanese researchers		To build the foundation for setting up overseas in the future		
Firms responding	831	161										
Frequency (total value)/Lateral percent	831	248.00	51	31.58	44	27.33	64	39.75	30	18.63	20	12.42
(1) ¥1 to 5 billion	308	40	5	17.86	5	17.86	13	46.43	2	7.14	5	17.86
(2) ¥5 to 10 billion	199	40	5	17.24	6	20.69	18	62.07	3	10.34	4	13.79
(3) ¥10 to 50 billion	240	105	23	33.33	19	27.54	24	34.78	14	20.29	6	8.70
(4) ¥50 to 100 billion	45	34	7	36.84	8	42.11	8	42.11	3	15.79	5	26.32
(5) More than ¥100 billion	39	29	11	68.75	6	37.50	1	6.25	8	50.00	0	0.00

Reasons for employing non-Japanese researchers  
It is a company-wide policy that is also being followed in the research depart.

By type of industry	Number firms surveyed	Frequency (total value)	Other
Firms responding	831	161	17
Frequency (total value)/Lateral percent	831	248.00	10.55
(1)Agriculture, forestry, and fisher	5	0	0
(2)Mining	4	0	0
(3)Construction	82	18	1
(4)Food processing	50	10	2
(5)Textiles	26	0	0
(6)Pulp and paper	19	2	1
(7)Printing and publishing	3	0	0
(8)Synthetic chemicals	62	21	4
(9)Oils, fats, and paints	11	1	0
(10)Pharmaceuticals	38	17	1
(11)Other chemicals	35	10	1
(12)Petroleum and coal products	18	3	0
(13)Plastic products	18	0	0
(14)Rubber products	6	0	0
(15)Ceramics	32	5	1
(16)Iron and steel	36	10	0
(17)Nonferrous metals	30	13	0
(18)Metal products	23	0	0
(19)Machinery	64	19	2
(20)Electrical machinery and appliances	84	46	1
(21)Communications, electronics, and electrical measuring instruments	39	26	2
(22)Automobiles	47	13	0
(23)Other transport machinery	18	8	1
(24)Precision machinery	24	18	0
(25)Other industries	14	3	0
(26)Transportation, communications, and public utilities	26	2	0
(27)Other types of industries	17	3	0

Reasons for employing non-Japanese researchers  
It is a company-wide policy that is also being followed in the research depart.

By scale of capital	Number firms surveyed	Frequency (total value)	Other
Firms responding	831	161	17
Frequency (total value)/Lateral percent	831	248.00	10.55
(1)¥1 to 5 billion	308	40	5
(2)¥5 to 10 billion	199	40	1
(3)¥10 to 50 billion	240	105	8
(4)¥50 to 100 billion	45	34	1
(5)More than ¥100 billion	39	29	2

Question 5.

Problems encountered in employing non-Japanese researchers

By type of industry	Number firms surveyed	Frequency (total value)	Education of children	Securing a place of work for spouses	Acquiring a work visa	Securing housing	Language problems					
Firms responding	831	161										
Frequency (total value)/Lateral percent	831	309.00	9	5.59	8	4.97	28	17.39	25	15.53	62	38.51
(1)Agriculture, forestry, and fisher	5	0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
(2)Mining	4	0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
(3)Construction	82	21	3	23.08	1	7.69	2	15.38	3	23.08	6	46.15
(4)Food processing	50	12	0	0.00	0	0.00	1	16.67	1	16.67	3	50.00
(5)Textiles	26	0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
(6)Pulp and paper	19	3	0	0.00	0	0.00	0	0.00	0	0.00	1	50.00
(7)Printing and publishing	3	2	0	0.00	0	0.00	1	100.00	0	0.00	0	0.00
(8)Synthetic chemicals	62	28	1	7.14	1	7.14	2	14.29	1	7.14	7	50.00
(9)Oils, fats, and paints	11	3	1	100.00	0	0.00	0	0.00	0	0.00	0	0.00
(10)Pharmaceuticals	38	18	1	11.11	0	0.00	0	0.00	3	33.33	3	33.33
(11)Other chemicals	35	17	0	0.00	0	0.00	3	33.33	1	11.11	3	33.33
(12)Petroleum and coal products	18	5	0	0.00	0	0.00	1	50.00	0	0.00	1	50.00
(13)Plastic products	18	0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
(14)Rubber products	6	0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
(15)Ceramics	32	7	0	0.00	1	25.00	0	0.00	0	0.00	1	25.00
(16)Iron and steel	36	8	0	0.00	0	0.00	0	0.00	0	0.00	2	33.33
(17)Nonferrous metals	30	20	0	0.00	3	33.33	2	22.22	2	22.22	4	44.44
(18)Metal products	23	0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
(19)Machinery	64	24	0	0.00	0	0.00	2	15.38	2	15.38	4	30.77
(20)Electrical machinery and appliances	84	49	1	3.45	2	6.90	4	13.79	2	6.90	9	31.03
(21)Communications, electronics, and electrical measuring instruments	39	35	1	6.67	0	0.00	5	33.33	3	20.00	7	46.67
(22)Automobiles	47	17	1	14.29	0	0.00	1	14.29	4	57.14	6	85.71
(23)Other transport machinery	18	8	0	0.00	0	0.00	0	0.00	2	40.00	1	20.00
(24)Precision machinery	24	26	0	0.00	0	0.00	4	36.36	1	9.09	3	27.27
(25)Other industries	14	3	0	0.00	0	0.00	0	0.00	0	0.00	1	50.00
(26)Transportation, communications, ar public utilities	26	1	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
(27)Other types of industries	17	2	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00

Problems encountered in employing non-Japanese researchers

By scale of capital	Number firms surveyed	Frequency (total value)	Education of children	Securing a place of work for spouses	Acquiring a work visa	Securing housing	Language problems					
Firms responding	831	161										
Frequency (total value)/Lateral percent	831	309.00	9	5.59	8	4.97	28	17.39	25	15.53	62	38.51
(1) ¥1 to 5 billion	308	57	2	6.90	1	3.45	9	31.03	4	13.79	11	37.93
(2) ¥5 to 10 billion	199	48	1	3.57	1	3.57	5	17.86	2	7.14	10	35.71
(3) ¥10 to 50 billion	240	133	4	5.80	3	4.35	8	11.59	6	11.59	29	42.03
(4) ¥50 to 100 billion	45	42	1	5.00	1	5.00	4	20.00	6	30.00	8	40.00
(5) More than ¥100 billion	39	29	1	6.67	2	13.33	2	13.33	5	33.33	4	26.67



Problems encountered in employing non-Japanese researchers

By type of industry	Number firms surveyed	Frequency (total value)	Problems with customs and religious beliefs	Employment conditions (high wages, etc.)	High turnover	Difficulties in accessing excellent researchers	Differences in research style
Firms responding	831	161					
Frequency (total value)/Lateral percent	831	309.00	26	16.15	20	12.42	30
(1) Agriculture, forestry, and fisher	5	0	0	0.00	0	0.00	0
(2) Mining	4	0	0	0.00	0	0.00	0
(3) Construction	82	21	1	7.69	0	15.38	1
(4) Food processing	50	12	0	0.00	0	0.00	2
(5) Textiles	26	0	0	0.00	0	0.00	0
(6) Pulp and paper	19	3	0	0.00	0	50.00	1
(7) Printing and publishing	3	2	0	0.00	0	100.00	0
(8) Synthetic chemicals	62	28	1	7.14	2	21.43	2
(9) Oils, fats, and paints	11	3	1	100.00	0	0.00	1
(10) Pharmaceuticals	38	18	1	11.11	0	44.44	1
(11) Other chemicals	35	17	3	33.33	2	11.11	0
(12) Petroleum and coal products	18	5	1	50.00	0	50.00	1
(13) Plastic products	18	0	0	0.00	0	0.00	0
(14) Rubber products	6	0	0	0.00	0	0.00	0
(15) Ceramics	32	7	2	50.00	0	0.00	0
(16) Iron and steel	36	8	2	33.33	0	16.67	0
(17) Nonferrous metals	30	20	0	0.00	2	11.11	4
(18) Metal products	23	0	0	0.00	0	0.00	0
(19) Machinery	64	24	1	7.69	4	23.08	2
(20) Electrical machinery and appliances	84	49	4	13.79	4	13.79	8
(21) Communications, electronics, and electrical measuring instruments	39	35	6	40.00	5	33.33	2
(22) Automobiles	47	17	0	0.00	0	42.86	1
(23) Other transport machinery	18	8	1	20.00	0	20.00	0
(24) Precision machinery	24	26	2	18.18	3	27.27	4
(25) Other industries	14	3	0	0.00	0	50.00	0
(26) Transportation, communications, and public utilities	26	1	0	0.00	0	100.00	0
(27) Other types of industries	17	2	0	0.00	0	50.00	0

Problems encountered in employing non-Japanese researchers

By scale of capital	Number firms surveyed	Frequency (total value)	Problems with customs and religious beliefs	Employment conditions (high wages, etc.)	High turnover	Difficulties in accessing excellent researchers	Differences in research style
Firms responding	831	161					
Frequency (total value)/Lateral percent	831	309.00	26	16.15	20	12.42	30
(1) ¥1 to 5 billion	308	57	6	20.59	1	3.45	6
(2) ¥5 to 10 billion	199	48	4	14.29	2	7.14	6
(3) ¥10 to 50 billion	240	133	9	13.04	10	17.39	13
(4) ¥50 to 100 billion	45	42	4	20.00	4	20.00	3
(5) More than ¥100 billion	39	29	3	20.00	1	6.67	2

Question 7. Why R&D strongpoints in Japan carry out joint research with overseas firms

By type of industry	Number firms surveyed	Frequency (total value)	Frequency (total value)/Lateral percent	831	247	342.00	23	9.31	116	46.96	54	21.86	14	5.67	108	43.72	In order to draw up common product standards	To share in development of new products
Firms responding	831	247																
Frequency (total value)/Lateral percent	831	342.00																
(1)Agriculture, forestry, and fisher	5	0																
(2)Mining	4	1																
(3)Construction	82	13																
(4)Food processing	50	22																
(5)Textiles	26	6																
(6)Pulp and paper	19	2																
(7)Printing and publishing	3	3																
(8)Synthetic chemicals	62	32																
(9)Oils, fats, and paints	11	7																
(10)Pharmaceuticals	38	42																
(11)Other chemicals	35	22																
(12)Petroleum and coal products	18	8																
(13)Plastic products	18	5																
(14)Rubber products	6	5																
(15)Ceramics	32	7																
(16)Iron and steel	36	16																
(17)Nonferrous metals	30	12																
(18)Metal products	23	4																
(19)Machinery	64	26																
(20)Electrical machinery and appliances	84	37																
(21)Communications, electronics, and electrical measuring instruments	39	13																
(22)Automobiles	47	19																
(23)Other transport machinery	18	7																
(24)Precision machinery	24	8																
(25)Other industries	14	6																
(26)Transportation, communications, and public utilities	26	12																
(27)Other types of industries	17	7																

Why R&D strongpoints in Japan carry out joint research with overseas firms

By scale of capital	Number firms surveyed	Frequency (total value)	Frequency (total value)/Lateral percent	831	247	342.00	23	9.31	116	46.96	54	21.86	14	5.67	108	43.72	In order to draw up common product standards	To share in development of new products
Firms responding	831	247																
Frequency (total value)/Lateral percent	831	342.00																
(1)¥1 to 5 billion	308	64																
(2)¥5 to 10 billion	199	50																
(3)¥10 to 50 billion	240	148																
(4)¥50 to 100 billion	45	42																
(5)More than ¥100 billion	39	38																

Question 8. Establishment of laboratories that play a leading role such as Bell Labs

By type of industry	Number firms surveyed	Frequency (total value)	That kind of lab is necessary, and we are already setting one up	That kind of lab is necessary, and we are planning to set one up	Although we recognize need for such a lab, our company does not think of setting one up	Bringing such a lab into existence in Japan's research climate would be difficult	Even from a worldwide view, firms do not need such labs
Firms responding	831	796	7	8	631	75	23
Frequency (total value)/Lateral percent	831	796.00	7	0.88	631	75	2.89
(1) Agriculture, forestry, and fisher	5	4	0	0.00	4	0	0.00
(2) Mining	4	3	0	0.00	2	1	0.00
(3) Construction	82	77	0	0.00	65	6	0.00
(4) Food processing	50	47	0	0.00	39	5	0.00
(5) Textiles	26	24	0	0.00	16	4	0.00
(6) Pulp and paper	19	18	0	0.00	12	3	0.00
(7) Printing and publishing	3	3	0	0.00	3	0	0.00
(8) Synthetic chemicals	62	61	0	0.00	47	4	0.00
(9) Oils, fats, and paints	11	11	0	0.00	10	0	0.00
(10) Pharmaceuticals	38	38	1	2.63	28	7	2.63
(11) Other chemicals	35	35	2	5.71	25	4	5.71
(12) Petroleum and coal products	18	17	0	0.00	15	2	0.00
(13) Plastic products	18	18	0	0.00	12	2	16.67
(14) Rubber products	6	6	0	0.00	5	1	0.00
(15) Ceramics	32	28	0	0.00	23	3	3.57
(16) Iron and steel	36	35	0	0.00	26	5	3.71
(17) Nonferrous metals	30	29	0	0.00	21	4	6.90
(18) Metal products	23	23	0	0.00	20	2	0.00
(19) Machinery	64	64	1	1.56	56	3	1.56
(20) Electrical machinery and appliances	84	76	1	1.32	57	6	3.95
(21) Communications, electronics, and electrical measuring instruments	39	39	0	0.00	33	0	2.56
(22) Automobiles	47	44	0	0.00	38	3	0.00
(23) Other transport machinery	18	18	0	0.00	11	3	11.11
(24) Precision machinery	24	23	0	0.00	20	2	0.00
(25) Other industries	14	14	1	7.14	10	1	0.00
(26) Transportation, communications, and public utilities	26	24	1	4.17	20	2	0.00
(27) Other types of industries	17	17	0	0.00	13	2	0.00

Establishment of laboratories that play a leading role such as Bell Labs

By scale of capital	Number firms surveyed	Frequency (total value)	That kind of lab is necessary, and we are already setting one up	That kind of lab is necessary, and we are planning to set one up	Although we recognize need for such a lab, our company does not think of setting one up	Bringing such a lab into existence in Japan's research climate would be difficult	Even from a worldwide view, firms do not need such labs
Firms responding	831	796	7	8	631	75	23
Frequency (total value)/Lateral percent	831	796.00	7	0.88	631	75	2.89
(1) ¥1 to 5 billion	308	293	0	0.00	229	24	3.41
(2) ¥5 to 10 billion	199	192	0	0.00	155	19	1.04
(3) ¥10 to 50 billion	240	230	3	1.30	186	24	2.61
(4) ¥50 to 100 billion	45	45	2	4.44	33	6	6.67
(5) More than ¥100 billion	39	36	2	5.56	28	2	5.56

## Question 9.

About publishing the results from basic research departments, now

By type of industry	Number firms surveyed	Frequency (total value)	Publish more than U.S. and European firms	Publish the same as U.S. and European firms	Do not publish as much as U.S. and European firms	Do not do basic research	Other
Firms responding	831	775	19	146	208	340	62
Frequency (total value)/Lateral percent	831	775.00	19	146	208	340	62
(1) Agriculture, forestry, and fisher	5	3	0	1	1	1	0
(2) Mining	4	4	0	1	3	0	0
(3) Construction	82	74	2	12	21	31	8
(4) Food processing	50	47	2	8	17	17	3
(5) Textiles	26	22	0	5	8	7	3
(6) Pulp and paper	19	18	0	3	3	10	2
(7) Printing and publishing	3	3	1	1	0	1	0
(8) Synthetic chemicals	62	56	0	13	15	25	3
(9) Oils, fats, and paints	11	10	0	1	2	7	0
(10) Pharmaceuticals	38	37	1	9	21	4	2
(11) Other chemicals	35	34	1	5	14	13	1
(12) Petroleum and coal products	18	17	1	5	6	7	2
(13) Plastic products	18	18	0	1	6	9	2
(14) Rubber products	6	6	0	0	3	3	0
(15) Ceramics	32	30	1	8	9	10	2
(16) Iron and steel	36	35	2	7	5	20	1
(17) Nonferrous metals	30	26	1	3	4	12	3
(18) Metal products	23	21	0	3	3	14	1
(19) Machinery	64	61	1	13	13	30	4
(20) Electrical machinery and appliances	84	78	1	19	13	39	6
(21) Communications, electronics, and electrical measuring instruments	39	38	2	8	9	18	1
(22) Automobiles	47	43	1	8	9	22	3
(23) Other transport machinery	18	18	2	1	4	9	2
(24) Precision machinery	24	23	0	5	9	6	3
(25) Other industries	14	12	0	1	7	4	0
(26) Transportation, communications, and public utilities	26	24	0	4	2	12	6
(27) Other types of industries	17	17	0	2	1	9	5

About publishing the results from basic research departments, now

By scale of capital	Number firms surveyed	Frequency (total value)	Publish more than U.S. and European firms	Publish the same as U.S. and European firms	Do not publish as much as U.S. and European firms	Do not do basic research	Other
Firms responding	831	775	19	146	208	340	62
Frequency (total value)/Lateral percent	831	775.00	19	146	208	340	62
(1) \$1 to 5 billion	308	283	7	26	60	158	32
(2) \$5 to 10 billion	199	186	3	33	54	85	11
(3) \$10 to 50 billion	240	227	3	56	77	78	13
(4) \$50 to 100 billion	45	44	3	32	14	11	2
(5) More than \$100 billion	39	35	3	17	3	8	4

# VI. Making Rules To Facilitate the Activities of Private Firms

## Question 1.

Trouble with the United States over intellectual property rights

By type of industry	Number firms surveyed	Frequency (total value)	Increasing	No change	Decreasing
Firms responding	831	629	150	464	15
Frequency (total value)/Lateral percent	831	629.00	150	464	15
(1) Agriculture, forestry, and fisher	5	0	0	0	0
(2) Mining	4	2	0	2	0
(3) Construction	82	43	2	41	0
(4) Food processing	50	34	6	28	0
(5) Textiles	26	20	4	17	0
(6) Pulp and paper	19	13	2	20	0
(7) Printing and publishing	3	3	1	2	0
(8) Synthetic chemicals	62	53	13	40	0
(9) Oils, fats, and paints	11	9	0	9	1
(10) Pharmaceuticals	38	34	7	27	0
(11) Other chemicals	35	28	9	18	1
(12) Petroleum and coal products	18	16	2	13	1
(13) Plastic products	18	16	3	13	0
(14) Rubber products	6	6	1	5	0
(15) Ceramics	32	24	4	20	0
(16) Iron and steel	36	25	5	20	0
(17) Nonferrous metals	30	21	4	17	0
(18) Metal products	23	18	1	16	1
(19) Machinery	64	52	12	37	3
(20) Electrical machinery and appliances	84	70	27	40	3
(21) Communications, electronics, and electrical measuring instruments	39	35	15	20	0
(22) Automobiles	47	38	9	27	2
(23) Other transport machinery	18	14	6	8	0
(24) Precision machinery	24	21	11	7	3
(25) Other industries	14	10	3	7	0
(26) Transportation, communications, and public utilities	26	12	1	11	0
(27) Other types of industries	17	12	2	10	0

Trouble with the United States over intellectual property rights

By scale of capital	Number firms surveyed	Frequency (total value)	Increasing	No change	Decreasing
Firms responding	831	629	150	464	15
Frequency (total value)/Lateral percent	831	629.00	150	464	15
(1) \$1 to 5 billion	308	207	28	174	5
(2) \$5 to 10 billion	199	153	30	116	7
(3) \$10 to 50 billion	240	197	64	132	1
(4) \$50 to 100 billion	45	41	16	23	2
(5) More than \$100 billion	39	31	12	19	0

S&I-related problems in relationships with the United States, now									
Question 2.	Number firms surveyed	Frequency (total value)	Problems relating to intellectual property rights	Problems relating to export control laws	Problems relating to antitrust laws	Criticism that Japan gets a free ride on basic research	Criticism of technology being boxed in by Japanese firms		
By type of industry									
Firms responding	831	772							
Frequency (total value)/Lateral percent	831	1153.00	268	34.72	112	14.51	58	7.51	69
(1) Agriculture, forestry, and fisher	5	1	0	0.00	0	0.00	0	0.00	0
(2) Mining	4	3	0	0.00	0	0.00	0	0.00	0
(3) Construction	82	98	3	4.11	1	1.37	10	13.70	6
(4) Food processing	50	62	12	26.09	3	6.52	3	6.52	4
(5) Textiles	26	30	5	21.74	2	8.70	1	4.35	1
(6) Pulp and paper	19	21	3	17.65	1	5.88	1	5.88	0
(7) Printing and publishing	3	3	2	66.67	0	0.00	0	0.00	0
(8) Synthetic chemicals	62	94	24	40.00	10	16.67	5	8.33	8
(9) Oils, fats, and paints	11	12	0	0.00	1	10.00	0	0.00	1
(10) Pharmaceuticals	38	57	16	44.44	2	5.56	4	11.11	2
(11) Other chemicals	35	55	15	45.45	7	21.21	2	6.06	2
(12) Petroleum and coal products	18	20	4	23.53	1	5.88	1	5.88	2
(13) Plastic products	18	20	3	16.67	0	0.00	1	5.56	0
(14) Rubber products	6	9	1	20.00	2	40.00	1	20.00	2
(15) Ceramics	32	44	7	24.14	2	6.90	3	10.34	1
(16) Iron and steel	36	49	10	31.25	8	25.00	3	9.38	3
(17) Nonferrous metals	30	48	12	41.38	7	24.14	3	10.34	5
(18) Metal products	23	28	6	30.00	1	5.00	2	10.00	2
(19) Machinery	64	100	28	45.16	11	17.74	5	8.06	6
(20) Electrical machinery and appliances	84	123	42	52.50	19	23.75	0	0.00	9
(21) Communications, electronics, and electrical measuring instruments	39	78	28	71.79	15	38.46	4	10.26	3
(22) Automobiles	47	67	14	32.56	9	20.93	4	9.30	4
(23) Other transport machinery	18	21	5	29.41	3	17.65	0	0.00	1
(24) Precision machinery	24	37	13	56.52	4	17.39	2	8.70	3
(25) Other industries	14	23	8	61.54	3	23.08	1	7.69	1
(26) Transportation, communications, and public utilities	26	31	3	12.50	0	0.00	2	8.33	2
(27) Other types of industries	17	19	4	25.00	0	0.00	0	0.00	1

S&I-related problems in relationships with the United States, now									
By scale of capital	Number firms surveyed	Frequency (total value)	Problems relating to intellectual property rights	Problems relating to export control laws	Problems relating to antitrust laws	Criticism that Japan gets a free ride on basic research	Criticism of technology being boxed in by Japanese firms		
Firms responding	831	772							
Frequency (total value)/Lateral percent	831	1153.00	268	34.72	112	14.51	58	7.51	69
(1) ¥1 to 5 billion	308	379	65	23.05	33	11.70	9	3.19	18
(2) ¥5 to 10 billion	199	280	65	35.33	31	16.85	16	8.70	12
(3) ¥10 to 50 billion	240	349	99	44.20	32	14.29	20	8.93	24
(4) ¥50 to 100 billion	45	80	23	52.27	7	15.91	9	20.45	7
(5) More than ¥100 billion	39	65	16	42.11	9	23.68	4	10.53	8

# S&I-related problems in relationships with the United States, now

By type of industry	Number firms surveyed	Frequency (total value)	Growing diffi- culty in introducing technology	Growing diffi- culty in accessing S&I information	Ways of thinking about social contributions (donations, etc.)	Existence of large technological gaps (with Japan in the superior position)	No problems
Firms responding	831	772	105	48	33	47	276
Frequency (total value)/Lateral percent	831	1153.00	13.60	6.22	33	4.27	35.75
(1) Agriculture, forestry, and fisher	5	1	0	0	0	0	0
(2) Mining	4	3	0	0	0	0	2
(3) Construction	82	98	8	10.96	0	0	24
(4) Food processing	50	62	5	10.87	0	0	22
(5) Textiles	26	30	4	17.39	0	0	11
(6) Pulp and paper	19	21	1	5.88	0	0	11
(7) Printing and publishing	3	3	0	0	0	0	1
(8) Synthetic chemicals	62	94	13	21.57	0	0	21
(9) Oils, fats, and paints	11	12	1	10.00	0	0	7
(10) Pharmaceuticals	38	57	10	27.78	2	5.56	9
(11) Other chemicals	35	55	8	24.24	4	12.12	9
(12) Petroleum and coal products	18	20	0	0	0	0	7
(13) Plastic products	18	20	3	16.67	0	0	11
(14) Rubber products	6	9	0	0	0	0	1
(15) Ceramics	32	44	5	17.24	4	17.24	13
(16) Iron and steel	36	49	4	12.50	0	0	9
(17) Nonferrous metals	50	48	3	10.34	0	0	10
(18) Metal products	23	28	3	15.00	1	5.00	5
(19) Machinery	64	100	11	17.74	4	6.45	21
(20) Electrical machinery and appliances	84	123	7	8.75	3	5.00	27
(21) Communications, electronics, and electrical measuring instruments	39	78	8	20.51	4	5.13	5
(22) Automobiles	47	67	6	13.95	5	6.98	12
(23) Other transport machinery	18	21	1	5.88	2	0	6
(24) Precision machinery	24	37	1	4.35	4	17.39	8
(25) Other industries	14	23	2	15.38	0	0	4
(26) Transportation, communications, and public utilities	26	31	1	4.17	0	0	14
(27) Other types of industries	17	19	0	0	0	0	6

# S&I-related problems in relationships with the United States, now

By scale of capital	Number firms surveyed	Frequency (total value)	Growing diffi- culty in introducing technology	Growing diffi- culty in accessing S&I information	Ways of thinking about social contributions (donations, etc.)	Existence of large technological gaps (with Japan in the superior position)	No problems
Firms responding	831	772	105	48	33	47	276
Frequency (total value)/Lateral percent	831	1153.00	13.60	6.22	33	4.27	35.75
(1) ¥1 to 5 billion	308	379	18	6.38	15	4.26	124
(2) ¥5 to 10 billion	199	280	29	15.76	14	6.52	60
(3) ¥10 to 50 billion	240	349	43	19.20	12	4.02	67
(4) ¥50 to 100 billion	45	80	11	25.00	3	0	12
(5) More than ¥100 billion	39	65	4	10.53	4	0	13

S&T-related problems in relationships with the United States, in the future

By type of industry	Number firms surveyed	Frequency (total value)	Frequency (total value)/Lateral percent	Problems relating to intellectual property rights	Problems relating to export control laws	Problems relating to antitrust laws	Criticism that Japan gets a free ride on basic research	Criticism of technology boxed in by Japanese firms
Firms responding	831	749						
Frequency (total value)/Lateral percent	831	1261.00		362	120	67	8.58	2.80
(1) Agriculture, forestry, and fisher	5	1		0	0	0	0.00	0.00
(2) Mining	4	3		0	0	0	0.00	0.00
(3) Construction	82	114		21	4	14	5.56	4.17
(4) Food processing	50	62		20	5	2	7.14	0.00
(5) Textiles	26	32		8	2	1	4.55	0.00
(6) Pulp and paper	19	24		5	3	2	5.88	0.00
(7) Printing and publishing	3	2		1	0	0	0.00	0.00
(8) Synthetic chemicals	62	101		27	10	8	8.93	1.79
(9) Oils, fats, and paints	11	15		2	1	0	10.00	0.00
(10) Pharmaceuticals	38	63		18	4	2	8.57	2.86
(11) Other chemicals	35	61		17	9	3	12.90	6.45
(12) Petroleum and coal products	18	23		4	2	1	17.65	0.00
(13) Plastic products	18	20		5	0	1	5.88	0.00
(14) Rubber products	6	14		4	2	0	16.67	1.67
(15) Ceramics	32	48		12	2	1	10.71	3.57
(16) Iron and steel	36	56		15	11	5	0.00	6.67
(17) Nonferrous metals	30	52		16	4	3	14.81	0.00
(18) Metal products	23	30		11	2	2	0.00	4.55
(19) Machinery	64	107		35	11	5	10.00	3.50
(20) Electrical machinery and appliances	84	129		45	15	3	10.53	2.63
(21) Communications, electronics, and electrical measuring instruments	39	82		31	14	4	10.81	2.70
(22) Automobiles	47	76		21	9	4	11.36	4.55
(23) Other transport machinery	18	25		6	4	0	5.88	0.00
(24) Precision machinery	24	41		14	4	2	17.39	4.35
(25) Other industries	14	23		9	2	1	7.69	0.00
(26) Transportation, communications, and public utilities	26	35		7	0	3	8.33	0.00
(27) Other types of industries	17	22		8	0	0	5.88	0.00

S&T-related problems in relationships with the United States, in the future

By scale of capital	Number firms surveyed	Frequency (total value)	Frequency (total value)/Lateral percent	Problems relating to intellectual property rights	Problems relating to export control laws	Problems relating to antitrust laws	Criticism that Japan gets a free ride on basic research	Criticism of technology boxed in by Japanese firms
Firms responding	831	749		362	120	67	8.58	2.80
Frequency (total value)/Lateral percent	831	1261.00		362	120	67	8.58	2.80
(1) ¥1 to 5 billion	308	388		90	37	13	6.32	1.12
(2) ¥5 to 10 billion	199	312		94	34	18	6.21	2.26
(3) ¥10 to 50 billion	240	396		130	32	21	10.31	3.59
(4) ¥50 to 100 billion	45	89		28	6	10	16.67	4.76
(5) More than ¥100 billion	39	76		20	7	5	18.42	10.53



S&T-related problems in relationships with the United States, in the future

By type of industry	Number firms surveyed	Frequency (total value)	Growing diffi- culty in introducing technology	Growing diffi- culty in accessing S&T information	Ways of thinking about social contributions (donations, etc.)	Existence of large technological gaps (with Japan in the superior position)	No problems					
Firms responding	831	749										
Frequency (total value)/Lateral percent	831	1261.00	151	20.16	72	9.61	35	4.67	77	10.28	188	25.10
(1)Agriculture, forestry, and fisher	5	1	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
(2)Mining	4	3	0	0.00	0	0.00	0	0.00	0	0.00	2	66.67
(3)Construction	82	114	13	18.06	8	11.11	1	1.39	9	12.50	14	19.44
(4)Food processing	50	62	9	21.43	3	7.14	0	0.00	3	7.14	13	30.95
(5)Textiles	26	32	5	22.73	1	4.55	0	0.00	2	9.09	9	40.91
(6)Pulp and paper	19	24	1	5.88	1	5.88	0	0.00	0	0.00	10	58.82
(7)Printing and publishing	3	2	0	0.00	0	0.00	0	0.00	0	0.00	1	50.00
(8)Synthetic chemicals	62	101	16	28.57	2	3.57	0	0.00	6	10.71	18	32.14
(9)Oils, fats, and paints	11	15	2	20.00	1	10.00	0	0.00	1	10.00	6	60.00
(10)Pharmaceuticals	38	63	13	37.14	5	14.29	0	0.00	5	14.29	6	17.14
(11)Other chemicals	35	61	5	16.13	4	12.90	2	6.45	7	22.58	6	19.35
(12)Petroleum and coal products	18	23	2	11.76	1	5.88	0	0.00	1	5.88	3	17.65
(13)Plastic products	20	20	4	23.53	0	0.00	1	5.88	1	5.88	7	41.18
(14)Rubber products	6	14	1	16.67	1	16.67	1	16.67	2	33.33	1	16.67
(15)Ceramics	32	48	6	21.43	5	17.86	3	10.71	3	10.71	9	32.14
(16)Iron and steel	36	56	5	16.67	2	6.67	2	6.67	3	10.00	5	16.67
(17)Nonferrous metals	30	52	7	25.93	6	22.22	1	3.70	2	7.41	6	22.22
(18)Metal products	23	30	3	13.64	1	4.55	1	4.55	1	4.55	4	18.18
(19)Machinery	64	107	11	18.33	11	18.33	6	10.00	1	1.67	12	20.00
(20)Electrical machinery and applianci	84	129	15	18.74	4	5.26	5	6.58	10	13.16	19	25.00
(21)Communications, electronics, and electrical measuring instruments	39	82	11	29.73	6	16.22	2	5.41	6	16.22	1	2.70
(22)Automobiles	47	76	10	22.73	3	6.82	4	9.09	4	9.09	7	15.91
(23)Other transport machinery	18	25	3	17.65	2	11.76	1	5.88	1	5.88	5	29.41
(24)Precision machinery	24	41	3	13.04	2	8.70	3	13.04	2	8.70	6	26.09
(25)Other industries	14	23	3	23.08	1	7.69	1	7.69	2	15.38	2	15.38
(26)Transportation, communications, ar public utilities	26	35	1	4.17	2	8.33	1	4.17	2	8.33	11	45.83
(27)Other types of industries	17	22	2	11.76	0	0.00	0	0.00	3	17.65	5	29.41

S&T-related problems in relationships with the United States, in the future

By scale of capital	Number firms surveyed	Frequency (total value)	Growing diffi- culty in introducing technology	Growing diffi- culty in accessing S&T information	Ways of thinking about social contributions (donations, etc.)	Existence of large technological gaps (with Japan in the superior position)	No problems					
Firms responding	831	749										
Frequency (total value)/Lateral percent	831	1261.00	151	20.16	72	9.61	35	4.67	77	10.28	188	25.10
(1)¥1 to 5 billion	308	388	30	11.15	21	7.81	10	3.72	19	7.06	96	35.69
(2)¥5 to 10 billion	199	312	42	23.73	16	9.04	11	6.21	21	11.86	36	20.34
(3)¥10 to 50 billion	20	396	61	27.35	24	10.76	11	4.93	24	10.76	42	18.83
(4)¥50 to 100 billion	45	89	11	26.19	6	14.29	0	0.00	8	19.05	5	11.90
(5)More than ¥100 billion	39	76	7	18.42	5	13.16	3	7.89	5	13.16	9	23.68

Question 3.

Items for which the existence of a worldwide common base in R&D activities is desired

By type of industry	Number firms surveyed	Frequency (total value)	An intellectual property system	A taxation system for R&D activities	Environmental regulations	Product liability	Regulations on the transfer of chemical weapons technology
Firms responding	831	806	526	65	154	161	8
Frequency (total value)/Lateral percent	831	1384.00	526	65	154	161	8
(1) Agriculture, forestry, and fisher	5	6	3	0	1	0	0
(2) Mining	4	5	1	25.00	1	0	0
(3) Construction	82	136	43	4.94	13	11	0
(4) Food processing	50	80	30	6.25	12	8	0
(5) Textiles	26	46	18	11.54	5	7	0
(6) Pulp and paper	19	33	10	0.00	8	2	1
(7) Printing and publishing	3	6	3	0.00	0	0	0
(8) Synthetic chemicals	62	100	45	13.11	11	10	1
(9) Oils, fats, and paints	11	17	3	10.00	8	3	0
(10) Pharmaceuticals	38	67	22	15.79	4	12	0
(11) Other chemicals	35	61	21	9.09	13	7	1
(12) Petroleum and coal products	18	31	11	5.88	4	5	0
(13) Plastic products	18	27	10	5.56	4	5	0
(14) Rubber products	6	10	5	0.00	1	0	0
(15) Ceramics	32	54	23	3.23	7	5	0
(16) Iron and steel	36	56	23	5.71	2	4	0
(17) Nonferrous metals	30	51	23	6.90	5	4	0
(18) Metal products	23	39	17	8.70	1	3	0
(19) Machinery	64	105	37	3.23	8	18	1
(20) Electrical machinery and appliances	84	141	54	9.76	10	20	0
(21) Communications, electronics, and electrical measuring instruments	39	70	33	10.53	4	8	1
(22) Automobiles	47	76	27	11.36	13	8	1
(23) Other transport machinery	18	31	9	11.11	3	6	0
(24) Precision machinery	24	42	18	8.70	2	8	1
(25) Other industries	14	26	9	0.00	6	3	0
(26) Transportation, communications, and public utilities	26	39	17	17.39	3	1	1
(27) Other types of industries	17	29	11	0.00	5	3	0

Items for which the existence of a worldwide common base in R&D activities is desired

By scale of capital	Number firms surveyed	Frequency (total value)	An intellectual property system	A taxation system for R&D activities	Environmental regulations	Product liability	Regulations on the transfer of chemical weapons technology
Firms responding	831	806	526	65	154	161	8
Frequency (total value)/Lateral percent	831	1384.00	526	65	154	161	8
(1) ¥1 to 5 billion	308	506	163	20	67	63	4
(2) ¥5 to 10 billion	199	334	125	11	33	39	1
(3) ¥10 to 50 billion	240	405	173	18	41	50	2
(4) ¥50 to 100 billion	45	77	37	9	9	9	0
(5) More than ¥100 billion	39	62	28	7	4	0	1

Items for which the existence of a worldwide common base in R&D activities is desired									
By type of industry	Number firms surveyed	Frequency (total value)	Regulations with respect to relations with strife-torn countries	Product standards	Treatment of foreign firms in connection with subsidies and loans from each country's government	Local contributions by public relations by publication of basic research results	Nothing in particular		
Firms responding	831	806							
Frequency (total value)/Lateral percent	831	1384.00	14	1.74	306	37.97	37	4.59	45
(1) Agriculture, forestry, and fisher	5	6	0	0.00	2	66.67	0	0.00	0
(2) Mining	4	5	0	0.00	1	25.00	0	0.00	0
(3) Construction	82	136	1	1.23	41	50.62	6	7.41	8
(4) Food processing	50	80	0	0.00	16	33.33	0	0.00	2
(5) Textiles	26	46	0	0.00	10	38.46	0	0.00	2
(6) Pulp and paper	19	33	0	0.00	4	21.05	3	15.79	4
(7) Printing and publishing	3	6	0	0.00	3	100.00	0	0.00	0
(8) Synthetic chemicals	62	100	3	4.92	12	19.67	2	3.28	2
(9) Oils, fats, and paints	11	17	0	0.00	1	10.00	0	0.00	0
(10) Pharmaceuticals	38	67	0	0.00	11	28.95	3	7.89	4
(11) Other chemicals	35	61	0	0.00	14	42.42	0	0.00	2
(12) Petroleum and coal products	18	31	0	0.00	8	47.06	0	0.00	1
(13) Plastic products	18	27	0	0.00	6	33.33	1	5.56	0
(14) Rubber products	6	10	0	0.00	4	66.67	0	0.00	0
(15) Ceramics	32	54	1	3.23	9	29.03	1	3.23	3
(16) Iron and steel	36	56	0	0.00	18	51.43	2	5.71	2
(17) Nonferrous metals	30	51	1	3.45	12	41.38	3	10.34	1
(18) Metal products	23	39	0	0.00	13	56.52	1	4.35	0
(19) Machinery	64	105	3	4.84	24	38.71	1	1.61	5
(20) Electrical machinery and appliances	84	141	1	1.22	31	37.80	7	8.54	3
(21) Communications, electronics, and electrical measuring instruments	39	70	0	0.00	17	44.74	2	5.26	1
(22) Automobiles	47	76	2	4.55	15	34.09	1	2.27	0
(23) Other transport machinery	18	31	1	5.56	7	38.89	1	5.56	1
(24) Precision machinery	24	42	0	0.00	7	30.43	0	0.00	0
(25) Other industries	14	26	0	0.00	8	57.14	0	0.00	0
(26) Transportation, communications, and public utilities	26	39	1	4.35	7	30.43	1	4.35	2
(27) Other types of industries	17	29	0	0.00	5	29.41	2	11.76	2
Items for which the existence of a worldwide common base in R&D activities is desired									
By scale of capital	Number firms surveyed	Frequency (total value)	Regulations with respect to relations with strife-torn countries	Product standards	Treatment of foreign firms in connection with subsidies and loans from each country's government	Local contributions by public relations by publication of basic research results	Nothing in particular		
Firms responding	831	806							
Frequency (total value)/Lateral percent	831	1384.00	14	1.74	306	37.97	37	4.59	45
(1) \$1 to 5 billion	308	506	7	2.36	113	38.05	11	3.70	20
(2) \$5 to 10 billion	199	334	2	1.03	93	47.94	10	5.15	9
(3) \$10 to 50 billion	240	405	4	1.72	86	36.91	9	3.86	9
(4) \$50 to 100 billion	45	77	0	0.00	5	11.36	2	4.55	4
(5) More than \$100 billion	39	62	1	2.63	9	23.68	5	13.16	3

Question 4.

R&D for solving global environmental problems

By type of industry	Number firms surveyed	Frequency (total value)	Doing such R&D	Investigating such R&D	Not doing such R&D
Firms responding	831	821	270	123	428
Frequency (total value)/Lateral percent	831	821.00	270	123	428
(1) Agriculture, forestry, and fisher	5	5	1	0	4
(2) Mining	4	4	0	0.00	80.00
(3) Construction	82	82	26	25.00	3
(4) Food processing	50	50	8	21.95	38
(5) Textiles	26	26	6	10.00	37
(6) Pulp and paper	19	18	10	15.38	16
(7) Printing and publishing	3	3	2	18.67	5
(8) Synthetic chemicals	62	62	25	33.33	0
(9) Oils, fats, and paints	11	10	6	14.52	28
(10) Pharmaceuticals	38	38	2	0.00	4
(11) Other chemicals	35	32	13	2.63	35
(12) Petroleum and coal products	18	18	8	18.75	13
(13) Plastic products	18	18	8	27.78	5
(14) Rubber products	6	6	2	15.67	7
(15) Ceramics	32	32	9	33.33	2
(16) Iron and steel	36	36	12	15.63	18
(17) Nonferrous metals	30	30	10	16.67	15
(18) Metal products	23	22	2	16.67	15
(19) Machinery	64	64	23	0.00	20
(20) Electrical machinery and appliances	84	83	31	10.94	34
(21) Communications, electronics, and electrical measuring instruments	39	39	9	12.05	42
(22) Automobiles	47	45	27	17.95	23
(23) Other transport machinery	18	18	6	17.78	10
(24) Precision machinery	24	24	4	11.11	10
(25) Other industries	14	14	3	8.33	18
(26) Transportation, communications, and public utilities	26	25	11	42.86	5
(27) Other types of industries	17	17	6	24.00	8
				5.88	10

R&D for solving global environmental problems

By scale of capital	Number firms surveyed	Frequency (total value)	Doing such R&D	Investigating such R&D	Not doing such R&D
Firms responding	831	821	270	123	428
Frequency (total value)/Lateral percent	831	821.00	270	123	428
(1) ¥1 to 5 billion	308	304	59	14.47	201
(2) ¥5 to 10 billion	199	196	51	15.82	114
(3) ¥10 to 50 billion	240	238	96	16.81	102
(4) ¥50 to 100 billion	45	45	6	11.11	6
(5) More than ¥100 billion	39	38	30	7.89	5

# R&D for solving global environmental problems

By type of industry	Number firms surveyed	Frequency (total value)/lateral percent	Technology that is expected to be put into effect by BDA, restrictions of each country that are expected in future		Technology for coping with government restrictions of each country that are expected in future		Development of technology that will contribute to solution of environmental problems		Other
			Frequency (total value)	governments overseas	Frequency (total value)	governments overseas	Frequency (total value)	governments overseas	
Firms responding	831	393	26	216	117	29.77	117	29.77	8.65
Frequency (total value)/lateral percent	831	393.00	26	216	117	29.77	117	29.77	8.65
(1) Agriculture, forestry, and fisher	5	1	0	0.00	0	0.00	1	100.00	0
(2) Mining	4	1	0	0.00	1	100.00	0	0.00	0
(3) Construction	82	44	13	29.55	6	13.64	21	47.73	4
(4) Food processing	50	13	3	23.08	1	7.69	7	53.85	2
(5) Textiles	26	10	0	0.00	8	80.00	1	10.00	1
(6) Pulp and paper	19	13	1	7.69	0	0.00	12	92.31	0
(7) Printing and publishing	3	3	0	0.00	1	33.33	2	66.67	0
(8) Synthetic chemicals	62	34	1	2.94	20	58.82	12	35.29	1
(9) Oils, fats, and paints	11	6	0	0.00	6	100.00	0	0.00	0
(10) Pharmaceuticals	38	3	0	0.00	2	66.67	1	33.33	0
(11) Other chemicals	35	20	0	0.00	13	65.00	6	30.00	1
(12) Petroleum and coal products	18	12	2	15.57	6	50.00	1	8.33	3
(13) Plastic products	18	11	0	0.00	5	45.45	6	54.55	0
(14) Rubber products	6	4	0	0.00	2	50.00	1	25.00	1
(15) Ceramics	32	14	1	7.14	8	57.14	4	28.57	1
(16) Iron and steel	36	18	0	0.00	10	55.56	5	27.78	3
(17) Nonferrous metals	30	15	0	0.00	8	53.33	7	46.67	0
(18) Metal products	23	3	0	0.00	2	66.67	1	33.33	0
(19) Machinery	64	30	3	10.00	19	63.33	6	20.00	2
(20) Electrical machinery and appliances	84	39	0	0.00	32	82.05	2	5.13	5
(21) Communications, electronics, and electrical measuring instruments	39	16	0	0.00	12	75.00	2	12.50	2
(22) Automobiles	47	35	0	0.00	31	86.11	5	13.89	0
(23) Other transport machinery	18	8	0	0.00	5	62.50	2	25.00	1
(24) Precision machinery	24	6	0	0.00	4	66.67	1	16.67	1
(25) Other industries	14	9	0	0.00	1	11.11	5	55.56	3
(26) Transportation, communications, and public utilities	26	17	2	11.76	11	64.71	3	17.65	1
(27) Other types of industries	17	7	0	0.00	2	28.57	3	42.86	2

# R&D for solving global environmental problems

By scale of capital	Number firms surveyed	Frequency (total value)/lateral percent	Technology that is expected to be put into effect by BDA, restrictions of each country that are expected in future		Technology for coping with government restrictions of each country that are expected in future		Development of technology that will contribute to solution of environmental problems		Other
			Frequency (total value)	governments overseas	Frequency (total value)	governments overseas	Frequency (total value)	governments overseas	
Firms responding	831	393	26	216	117	29.77	117	29.77	8.65
Frequency (total value)/lateral percent	831	393.00	26	216	117	29.77	117	29.77	8.65
(1) \$1 to 5 billion	308	104	6	5.77	55	52.88	34	32.59	9
(2) \$5 to 10 billion	199	83	4	4.82	44	53.01	27	32.53	8
(3) \$10 to 50 billion	240	133	10	7.52	71	53.38	41	30.83	11
(4) \$50 to 100 billion	45	39	5	12.82	22	56.41	10	25.64	2
(5) More than \$100 billion	39	34	1	2.94	24	70.59	5	14.71	4

## Question 5.

## Changes in the domestic situation surrounding firms

By type of industry	Number firms surveyed	Frequency (total value)	Rethinking Japan's legal regulations and other such systems	Expansion of the nation's support for R&D, e.g., subsidies, a tax-deduction system	National leadership such as in the establishment of research partnerships	Imparting the right knowledge to the citizens of Japan, raising their consciousness	Other
Firms responding	831	812	166	250	135	248	5
Frequency (total value)/Lateral percent	831	812.00	166	20.44	16.63	30.54	0.62
(1) Agriculture, forestry, and fisher	5	5	2	1	2	0	0
(2) Mining	4	4	0	1	1	2	0
(3) Construction	82	81	19	23	15	22	1
(4) Food processing	50	49	5	10.20	6	25	1
(5) Textiles	26	26	7	26.92	1	8	1
(6) Pulp and paper	19	19	2	10.53	4	8	0
(7) Printing and publishing	3	3	0	33.33	2	0	0
(8) Synthetic chemicals	62	61	17	27.87	12	18	0
(9) Oils, fats, and paints	11	10	1	10.00	0	2	0
(10) Pharmaceuticals	38	38	6	15.79	2	16	1
(11) Other chemicals	35	33	5	15.15	7	10	0
(12) Petroleum and coal products	18	17	1	5.88	3	2	0
(13) Plastic products	18	18	4	22.22	1	6	0
(14) Rubber products	6	6	1	15.67	2	3	0
(15) Ceramics	32	32	5	15.63	7	6	0
(16) Iron and steel	36	35	7	20.00	9	7	1
(17) Nonferrous metals	30	30	6	20.00	4	11	0
(18) Metal products	23	22	6	27.27	2	7	0
(19) Machinery	64	62	21	33.87	10	20	0
(20) Electrical machinery and appliances	84	82	14	17.07	15	30	0
(21) Communications, electronics, and electrical measuring instruments	39	38	7	18.42	6	5	0
(22) Automobiles	47	45	13	28.89	9	11	0
(23) Other transport machinery	18	17	5	29.41	2	6	0
(24) Precision machinery	24	23	5	21.74	4	8	0
(25) Other industries	14	14	4	28.57	1	5	0
(26) Transportation, communications, and public utilities	26	25	1	4.00	4	7	0
(27) Other types of industries	17	17	2	11.76	4	5	0

## Changes in the domestic situation surrounding firms

By scale of capital	Number firms surveyed	Frequency (total value)	Rethinking Japan's legal regulations and other such systems	Expansion of the nation's support for R&D, e.g., subsidies, a tax-deduction system	National leadership such as in the establishment of research partnerships	Imparting the right knowledge to the citizens of Japan, raising their consciousness	Other
Firms responding	831	812	166	250	135	248	5
Frequency (total value)/Lateral percent	831	812.00	166	20.44	16.63	30.54	0.62
(1) ¥1 to 5 billion	308	302	71	23.51	56	96	2
(2) ¥5 to 10 billion	199	194	41	21.13	29	61	1
(3) ¥10 to 50 billion	240	233	46	19.74	36	76	2
(4) ¥50 to 100 billion	45	45	5	11.11	8	4	0
(5) More than ¥100 billion	39	38	3	7.69	6	11	0

Changes in the international situation surrounding firms										Mutual understanding with respect to the differences depending on the country in the recognition of problems	
By type of industry	Number firms surveyed	Frequency (total value)	Standardization of legal regulations and other such systems by countries		Smooth promotion of international joint research	Leadership from the advanced countries	Developing countries' understanding towards global environmental problems		Mutual understanding with respect to the differences depending on the country in the recognition of problems		
			220	27.23			185	22.90			
Firms responding	831	808.00	220	27.23	160	185	53	6.56	178	22.03	
Frequency (total value)/Lateral percent	831	808.00	220	27.23	160	185	53	6.56	178	22.03	
(1) Agriculture, forestry, and fishery	5	5	3	60.00	0	0	0	0.00	2	40.00	
(2) Mining	4	4	0	0.00	0	2	0	0.00	2	50.00	
(3) Construction	82	80	12	15.00	22	22	4	5.00	19	23.75	
(4) Food processing	50	49	14	28.57	9	7	5	10.20	11	22.45	
(5) Textiles	26	26	5	19.23	5	7	4	15.38	4	15.38	
(6) Pulp and paper	19	19	4	21.05	0	6	2	10.53	7	36.84	
(7) Printing and publishing	3	3	1	33.33	0	0	0	0.00	2	66.67	
(8) Synthetic chemicals	62	61	18	29.51	9	10	2	3.28	21	34.43	
(9) Oils, fats, and paints	11	10	8	80.00	1	1	0	0.00	0	0.00	
(10) Pharmaceuticals	38	38	9	23.68	8	9	2	5.26	10	26.32	
(11) Other chemicals	35	33	10	30.30	7	7	0	0.00	9	27.27	
(12) Petroleum and coal products	18	17	2	11.76	6	6	2	11.76	1	5.88	
(13) Plastic products	18	18	5	27.78	4	3	1	5.56	5	27.78	
(14) Rubber products	6	6	2	33.33	1	2	0	0.00	1	16.67	
(15) Ceramics	32	32	8	25.00	2	9	3	8.33	9	28.13	
(16) Iron and steel	36	35	11	31.43	4	10	3	8.57	7	20.00	
(17) Nonferrous metals	30	30	9	30.00	5	6	2	6.67	8	26.67	
(18) Metal products	23	22	9	40.91	5	6	2	9.09	2	9.09	
(19) Machinery	64	62	12	19.35	15	17	2	6.45	13	20.97	
(20) Electrical machinery and appliances	84	81	31	38.27	13	15	5	8.17	15	18.52	
(21) Communications, electronics, and electrical measuring instruments	39	37	14	37.84	9	10	1	2.70	2	5.41	
(22) Automobiles	47	45	20	44.44	8	6	2	4.44	9	20.00	
(23) Other transport machinery	18	17	3	17.65	6	4	0	0.00	4	23.53	
(24) Precision machinery	24	23	4	17.39	5	10	0	0.00	3	13.04	
(25) Other industries	14	14	3	21.43	2	4	2	14.29	3	21.43	
(26) Transportation, communications, and public utilities	26	24	1	4.17	9	5	4	16.67	5	20.83	
(27) Other types of industries	17	17	2	11.76	5	3	3	17.65	4	23.53	

Changes in the international situation surrounding firms										Mutual understanding with respect to the differences depending on the country in the recognition of problems	
By scale of capital	Number firms surveyed	Frequency (total value)	Standardization of legal regulations and other such systems by countries		Smooth promotion of international joint research	Leadership from the advanced countries	Developing countries' understanding towards global environmental problems		Mutual understanding with respect to the differences depending on the country in the recognition of problems		
			220	27.23			185	22.90			
Firms responding	831	808.00	220	27.23	160	185	53	6.56	178	22.03	
Frequency (total value)/Lateral percent	831	808.00	220	27.23	160	185	53	6.56	178	22.03	
(1) ¥1 to 5 billion	308	301	79	26.25	65	67	19	6.31	63	20.93	
(2) ¥5 to 10 billion	199	193	65	33.68	35	38	12	6.22	43	22.28	
(3) ¥10 to 50 billion	240	232	59	25.43	42	51	14	6.03	52	22.41	
(4) ¥50 to 100 billion	45	44	12	27.27	9	7	4	9.09	12	27.27	
(5) More than ¥100 billion	39	38	5	13.16	9	12	4	10.53	8	21.05	

Changes in the international situation surrounding firms

Changes in the international situation surrounding firms										Mutual understanding with respect to the differences depending on the country in the recognition of problems		
By scale of capital	Number firms surveyed	Frequency (total value)	Standardization of legal regulations and other such systems by countries		Smooth promotion of international joint research	Leadership from the advanced countries	Developing countries' understanding towards global environmental problems		Mutual understanding with respect to the differences depending on the country in the recognition of problems			
			220	27.23			160	185		53	6.56	178
Firms responding	831	808.00	220	27.23	160	185	53	6.56	178	22.03		
Frequency (total value)/Lateral percent	831	808.00	220	27.23	160	185	53	6.56	178	22.03		
(1) ¥1 to 5 billion	308	301	79	26.25	65	21.59	67	22.26	19	6.31	63	20.93
(2) ¥5 to 10 billion	199	193	65	33.68	35	18.13	38	19.69	12	6.22	43	22.28
(3) ¥10 to 50 billion	240	232	59	25.43	42	18.10	51	26.29	14	6.03	52	22.41
(4) ¥50 to 100 billion	45	44	12	27.27	9	27.27	7	15.91	4	9.09	12	27.27
(5) More than ¥100 billion	39	38	5	13.16	9	23.68	12	31.58	4	10.53	8	21.05

## V. The Questionnaire

Management and Coordination Agency, Endorsement No. 17880  
Period of endorsement: Until 30 July 1991

CONFIDENTIAL

### Survey Report on Research Activities in Private Enterprises

This questionnaire will only be used for statistical purposes, so please fill in true facts.

Science and Technology Agency, S&T Policy Bureau

I. Fill in the table below to give a summary of your company.

3) Company name	
Respondent	(Names of your division and department):  (Your name): (Telephone No.):
4) Type of industry (Note 1)	5) Capital (as of 31 March 1991): x ¥100 million
7) FY90 sales	x ¥100 million
FY90 R&D expenditures (Note 2)	12) Total: ¥ million 13) Basic research outlays: ¥ million 14) Applied research outlays: ¥ million 15) Development research outlays: ¥ million
Consumption tax accounting processing 1. Tax-subtracted method                      2. Tax-included method	
16) Total number of employees (as of 31 March 1991): (Note 3)	
17) Number full-time researchers (as of 31 March 1991) (Note 4): (20) Foreign researchers among those (Note 5): )	
18) Number of patents held in Japan (the number of patents in Japan as of 31 March 1991 for technology that your company developed (Note 6):	
19) Number of patents held outside of Japan (Note 7):	
Remarks (change of address, address to which report is to be sent, and other relevant information):	



Note 1) For the type of industry, fill in the number from the table of industrial categories that corresponds to your company's product item with the largest amount of sales in FY90.

Note 2) R&D expenditures are the total amount of R&D-related outlays for personnel, raw materials, property, plant, and equipment. Fill in the amount of outlays for each of the following items.

Basic research: theoretical or experimental research for the purpose of forming hypotheses and theories, and not something that is expressly for a special application or use; or for the purpose of gaining new knowledge in connection with phenomena and observable facts.

Applied research: research that uses knowledge that was discovered through basic research, establishes specific objectives, and verifies the possibility of practical application; or research that searches for new application methods in connection with methods that have already been put into practical use.

Development research: research that is the utilization of the knowledge gained from applied research and actual experiments, the objective of which is to introduce new materials, apparatuses, products, systems, processes, etc., or to improve these.

Note 3) Fill in the total number of people employed at your company for at least one month as staff members or as officers.

Note 4) People who have completed university (excluding junior college) course work (or who have the equivalent or higher specialized knowledge) and who have at least two years of research experience; or, people who have been employed at your company for at least one month and who have a specific theme on which they are doing research. Note 5) Foreign researchers are people engaged in research activities whose nationality is other than Japanese and who have at least a month-long contract with your company. This does not include people whose research activities at your company are in the form of joint research, training, etc. (This is the same as last year's survey.) The other conditions are the same as in Note 4 above.

Note 6) This is for registered patents and does not include utility model rights, design rights, or trade-mark rights. This also does not include patents whose term of existence (in Japan, 15 years from the day that the application was released) has been exceeded.

Note 7) The number of patents held outside of Japan is the number of patents registered in foreign countries (including the European Patent Agency. If the same patent is registered in more than one country, count the number of countries in which the patent is registered.

No.	Type of industry
1	Agriculture, forestry, and fisheries
2	Mining
3	Construction
4	Food processing
5	Textiles
6	Pulp and paper
7	Printing and publishing
8	Chemical fertilizers, inorganic chemicals, organic chemicals, and chemical fibers
9	Oils, fats, and paints
10	Pharmaceuticals
11	Chemicals not covered in items 8-10
12	Petroleum and coal products
13	Plastic products
14	Rubber products
15	Ceramics
16	Iron and steel
17	Nonferrous metals
18	Metal products
19	Machinery
20	Electrical machinery and appliances
21	Communications, electronics, and electrical measuring instruments
22	Automobiles
23	Transport machinery not covered in item 22
24	Precision machinery
25	Industries not covered in items 4-24
26	Transportation, communications, and public utilities
27	Other types of industries

II. Fill in the total sales and R&D expenditures of all of your company's overseas affiliated firms (50% or more financed) for FY90.

Sales: ¥million

R&D expenditures: ¥ million yen

### III. Perception of International Situation in Relation to S&T

Question 1. In comparison with the U.S. and Europe, how do you rate your company's R&D strength in the industrial category under which your company falls? For five years ago, now, and five years from now, circle the one number that corresponds to your answer.

Note) In the case where your company's R&D in its respective industrial category covers several departments, give an answer for your R&D strength in connection with your major product.

	5 years ago	Now	5 years later
1. Japan > U.S. > Europe	1	1	1
2. Japan > Europe > U.S.	2	2	2
3. U.S. > Japan > Europe	3	3	3
4. U.S. > Europe > Japan	4	4	4
5. Europe > Japan > U.S.	5	5	5
6. Europe > U.S. > Japan	6	6	6
7. Japan > U.S. = Europe	7	7	7
8. U.S. > Japan = Europe	8	8	8
9. Europe > Japan = U.S.	9	9	9
10. Japan = Japan > Europe	10	10	10
11. Japan = Europe > U.S.	11	11	11
12. U.S. = Europe > Japan	12	12	12
13. Japan = U.S. = Europe	13	13	13
14. Don't know	14	14	14

Question 2. In the international situation surrounding Japan, various problems in the economic face of things are arising, number one of which is trade problems. In connection with S&T, what do you think? Keeping in mind the category of industry under which your company falls, circle one of the numbers below that corresponds to your answer.

No.	
1.	Because other countries will also be building up their S&T strength, which is the wellspring of economic power, tense international relations in connection with S&T (technology disputes, etc.) will become more intense.
2.	Competition involving S&T among Japan, Europe and the United States will exist in the future, too, but there are also continuing efforts that grope for cooperation in regions, so tense international relations will continue partly and intermittently.
3.	In S&T activities, progress will be made in international cooperation, and tense international relations will diminish.
4.	Because the three poles—Japan, Europe, and the United States—are moving towards becoming economic blocks, there will be no progress in international cooperation with respect to technology, and tense international relations will also diminish.
5.	Other

We asked the following question of firms that answered 1. or 2. to the question above.

If tense international relations in connection with S&T do not disappear, how will your company cope with the situation? Circle one of the numbers below that corresponds to your answer.

No.	
1.	Technology transfer (providing technology to firms in the area, transferring technology to subsidiaries in the area, etc.).
2.	R&D cooperation.
3.	Establishing R&D strongpoints overseas.
4.	Endeavoring to gain the understanding of society in the area.
5.	We will not deal with it in any active way.
6.	Other

Question 3. How does your company see the technological strength of the Asian NIEs (in particular, Korea and Taiwan) in the same category of industry? Circle one of the numbers below that corresponds to your answer.

No.	
1.	They are now our competitors.
2.	Later (after three to 5 years) we think they will become our competitors.
3.	They will not become our competitors for a long time (more than seven or eight years).
4.	Other

#### IV. State of Globalization of Private Enterprises' R&D Activities

Question 1. Does your company now have R&D strongpoints overseas? (I.e., strongpoints where two or more researchers do R&D work. Includes overseas affiliated firms (50% or more financed). The same applies below.) Circle one of the numbers below that corresponds to your answer. For those firms that do have overseas strongpoints, fill in the number of strongpoints.

No.	
1.	Yes, we have. (Number of strongpoints:     ) Go to Questions 2-8
2.	No, we do not have. Go to Question 9.

Question 2. We asked this question of enterprises that have R&D strongpoints overseas.

For the region(s) in which your company has set up (or plans to set up) an overseas strongpoint, circle one of the numbers below that corresponds to the time period during which your company set up, or plans to set up the strongpoint. (If there is more than one strongpoint in a region, the strongpoint that was set up most recently.)

Set up	United States	Western Europe	Other advanced countries	Asian NIEs	Other
Before 1969	1	1	1	1	1
1970~1979	2	2	2	2	2
1980~1984	3	3	3	3	3
1985~1991	4	4	4	4	4
Plan to in the future	5	5	5	5	5

Question 3. We asked this question of enterprises that have R&D strongpoints overseas.

For each region in which your company has set up overseas strongpoints, circle up to three numbers that correspond to your company's reasons for doing so. Of those items that you circled, put a double circle around the item for which there had already been results.

	[A]	[B]	[C]	[D]	[E]
1. To strengthen the technological power of production strongpoints (to strengthen production-research tieups).	1	1	1	1	1
2. R&D that copes with overseas needs, R&D for the purpose of improving products (to develop products that fir the area).	2	2	2	2	2
3. To search for the technology seeds (to secure basic research information).	3	3	3	3	3
4. To promote joint research with universities and firms in other countries.	4	4	4	4	4
5. To secure and to use the superb genius [i.e., talented researchers and engineers] overseas.	5	5	5	5	5
6. To provide stimulus to the entire company (e.g., conceptual changes).	6	6	6	6	6
7. We came to won R&D strongpoints through acquisitions of overseas firms.	7	7	7	7	7
8. For affiliated firms to make inroads overseas.	8	8	8	8	8
9. In order not to lag behind in the industrial world.	9	9	9	9	9
10. To make the name of our firm penetrate in order to facilitate future production and sales.	10	10	10	10	10
11. To improve the image of our firm in the country.	11	11	11	11	11
12. To avoid friction (governmental incentives). (In order to be recognized as a firm within the region, etc.).	12	12	12	12	12
13. Other reasons (explain in concrete terms).	13	13	13	13	13

[A] United States; [B] Western Europe; [C] Other advanced countries;  
[D] Asian NIEs; [E] Other

Question 4. We asked this question of enterprises that have R&D strongpoints overseas.

What kind of research management problems did your company encounter overseas when it set up R&D strongpoints, and what kind of problems is your company encountering now or will it encounter in the future? Circle up to three numbers each for research strongpoints in Europe, the United States, and Asia.

	When set up		Now		In future	
	[A]	[B]	[A]	[B]	[A]	[B]
1. The regulations and systems of the government there.						
2. The treatment of intellectual property rights (dealing with the legal problems that are due to the legal system there).						
3. Expenses are too high.						
4. The company's overall strategy on overseas expansion is inadequate.						
5. Cooperating and coming to an understanding with the main office in Japan or the overseas production site has not gone well.						
6. Ensuring R&D personnel overseas.						
7. Not enough talented people dispatched overseas by our company.						
8. High turnover in researchers, accumulation of technology is delayed.						
9. The efficient yield of R&D results.						
10. Research assessments and other such aspects of the research environment are different.						
11. The style of the research (the differences between project-ism and individualism).						
12. Criticism of technology being boxed in by Japanese firms.						
13. No problems.						
14. Other (explain in concrete terms).						

[A] Europe and United States; [B] Asia

Question 5. We asked this question of enterprises that have R&D strongpoints overseas.

What kind of effect do you expect that the establishment of R&D strongpoints in Europe and the U.S. will have on R&D strongpoints in Japan? Circle one of the numbers below that corresponds to your answer.

No.	
1.	Communications with Europe and the United States will be easier.
2.	Information about international seeds (technology seeds) will be acquired.
3.	It will raise the consciousness of the researchers.
4.	It will internationalize research management.
5.	We have no expectations.
6.	Other (explain in concrete terms).

Question 6. We asked this question of enterprises that have R&D strongpoints overseas.

What is the content of the research being done at your company's R&D strongpoints overseas? Circle up to two numbers each for the research content now and for that your company plans to do after five years.

	Now	After 5 years
1. The development of products that correspond to the market in the area.	1	1
2. Research for the purpose of improving productivity.	2	2
3. Research to clear the regulations there.	3	3
4. The development of what will become core technologies.	4	4
5. Basic research.	5	5
6. Other	6	6



Question 7. We asked this question of enterprises that have R&D strongpoints overseas.

Indicate the total number of researchers and their nationalities at all of your company's overseas R&D strongpoints by circling one number each for five years ago, now, and in five years.

<No. of researchers>

	5 years ago	Now	After 5 years
0	1	1	1
1-4 people	2	2	2
5 or more people	3	3	3
10 or more people	4	4	4
20 or more people	5	5	5
50 or more people	6	6	6
100 or more people	7	7	7
200 or more people	8	8	8
500 or more people	9	9	9

<Nationalities>

	5 years ago	Now	After 5 years
Mainly non-Japanese	1	1	1
Mainly Japanese	2	2	2
Half and half	3	3	3

Question 8. We asked this question of enterprises that have R&D strongpoints overseas.

How many joint research efforts are your company's overseas R&D strongpoints carrying out with universities, firms, and government research institutes in foreign countries? Fill in the number of projects five years ago and now.

Five years ago:

Now:

Question 9. We asked this question of enterprises that did not set up R&D strongpoints overseas (and those who do not plan to). Why did your company not do so? Circle one of the numbers below that corresponds to your answer.

No.	
1.	Our R&D strongpoints in Japan are sufficient, and there is no need to establish any overseas.
2.	R&D overseas is inefficient.
3.	Coping with the local systems is a lot of trouble.
4.	We cannot afford to set up strongpoints overseas.
5.	The risk is high.
6.	Other (explain in concrete terms).

Question 10. Circle one of the numbers below that corresponds to the results of your company's technology trade in FY90.

(Technology trade is when you supply to or receive from a foreign country technology such as patents, know-how, and technical guidance.)

No.	
1.	Both technology trade imports and exports.
2.	Only technology trade exports (value received).
3.	Only technology trade imports (value paid out).
4.	No technology trade.

→ We asked this question of those enterprises who answered that they had technology trade exports [i.e., answered 1. or 2. above].

To what extent did your company's overseas subsidiaries (overseas corporations in which your company invested 50% or more) and other overseas firms share in the amount of your technology trade exports? Circle one of the numbers below that corresponds to your answer.

No.	
1.	Subsidiaries only.
2.	Mostly subsidiaries.
3.	About the same degree.
4.	Mostly nonsubsidiaries.
5.	Only nonsubsidiaries.

Question 11. In your company's R&D strategy, what is the relative importance of the Asian NIEs? Circle two of the numbers below that correspond to your answers.

No.	
1.	Not important as R&D strongpoints. (We do not anticipate them becoming R&D strongpoints.)
2.	Product development strongpoints (including production support).
3.	R&D strongpoints for important technology.
4.	Basic research strongpoints.
5.	Strongpoints for joint research with research organizations, universities, and firms of Asian NIEs.
6.	Other (explain in concrete terms).

Question 12. This question is about contributions (that which pertain to R&D) made and research commissioned to universities overseas and in Japan. Circle one number each for overseas universities and for Japanese universities that corresponds to the total amount of contributions and fees for research commissioned to universities during FY1990. If the amount is more than 100 million yen, fill in the amount.

	Overseas universities	Japanese universities
1. Nothing at all	1	1
2. Less than ¥1 million.	2	2
3. More than ¥1 million.	3	3
4. More than ¥5 million.	4	4
5. More than ¥10 million.	5	5
6. More than ¥100 million.	6 (x ¥100 million)	6 (x ¥100 million)

Question 13. We asked this question of firms who contribute more and commission more research to overseas universities than to Japanese universities.

Why is that so? Circle two of the numbers below that correspond to your answers.

No.	
1.	We would like to contribute to Japanese universities, but the tax system prevents it.
2.	Overseas universities are at a higher level.
3.	Overseas, contributions are a social custom (a part of philanthropy).
4.	Because Japanese universities are not accustomed to industry-university cooperation.
5.	Other (explain in concrete terms).

Question 14. The ultimate image of your company's international expansion of R&D (globalization) is close to which of the choices given below? Circle one of the numbers below that corresponds to your answer.

No.	
1.	Our R&D strongpoints in Japan, the United States, and Europe (Japan and the United States, Japan and Europe) each carry out R&D with originality.
2.	We have the core R&D functions in Japan; overseas, we only set up supplemental R&D functions so that we can cope with production technology and local needs.
3.	Although we have the core R&D functions in Japan and the supplemental R&D functions overseas, we aim for a composite sort of expansion that, for example, places high-originality R&D functions in a place such as the U.S. where there is a substantial market.
4.	It goes according to affiliated companies and clients. It is not an image of independence.
5.	We do not intend to internationally expand R&D (globalize).
6.	Other (explain in concrete terms).

# V. State of Globalization of R&D Strongpoints in Japan

Question 1. How many non-Japanese researchers does your company employ in Japan? Fill in the numbers for three years ago and for now, according to nationality.

	3 years ago	Now
Americans		
Western Europeans		
Asians		
Other nationalities		

Question 2. Circle one of the numbers below that corresponds to the target percentage of overall researchers that non-Japanese researchers will account for in the future at your company's R&D strongpoints in Japan.

No.	
1.	0%
2.	About 1%
3.	About 2%
4.	About 4%
5.	About 6%
6.	About 8%
7.	About 10%
8.	About 15%
9.	20% or higher
10.	Our company has not set a target.

Question 3. Fill in the number of non-Japanese researchers your company currently has accepted as trainees, the number of non-Japanese researchers accepted as part of mutual dispatching, and the number of Japanese researchers your company has sent to foreign countries.

Accepted as trainees: \_\_\_\_\_ people  
Accepted because of mutual dispatching: \_\_\_\_\_ people  
Sent to foreign countries: \_\_\_\_\_ people

Question 4. We asked this question of enterprises who employ non-Japanese researchers at their R&D strongpoints in Japan.

What are the reasons for employing non-Japanese researchers at your R&D strongpoints in Japan? Circle two of the numbers below that correspond to your answer. Put a double circle around the item for which there have already been results.

No.	
1.	To develop new technology that is touched off by differences in concepts.
2.	To globalize research management (to introduce international points of view).
3.	To shore up the lack of talented personnel.
4.	Expectations from superb researchers that cannot be expected from Japanese researchers.
5.	To build the foundation for setting up overseas in the future.
6.	It is a company-wide policy that is also being followed in the research department.
7.	Other (explain in concrete terms).

Question 5. We asked this question of enterprises who employ non-Japanese researchers at their R&D strongpoints in Japan.

What are some of the problems encountered when employing non-Japanese researchers? Circle up to three of the numbers below that correspond to your answers.

No.	
1.	Education of children.
2.	Securing a place of work for spouses.
3.	Acquiring a work visa.
4.	Securing housing.
5.	Language problems.
6.	Problems with customs and religious beliefs.
7.	Employment conditions (high wages, etc.).
8.	High turnover.
9.	Difficulties in accessing excellent researchers.
10.	There are differences in research style (project-ism, individualism).
11.	No problems.
12.	Other (explain in concrete forms).

Question 6. How many joint research projects are your company's R&D strongpoints in Japan carrying out with universities, firms, and government research institutes in foreign countries? Fill in the number of projects five years ago and now.

Five years ago:

Now:

Question 7. We asked this question of firms that are carrying out (or had carried out) joint research with overseas firms.  
 What are your reasons for carrying out joint research with overseas firms?  
 Circle up to two of the numbers below that correspond to your answers.

No.	
1.	Because it is difficult to do joint research with Japanese firms.
2.	Because there are no Japanese firms that have creative philosophy and distinctive technology in connection with the technology fields where joint research can be done.
3.	Because it is a foothold for our company's future globalization.
4.	In order to draw up common product standards.
5.	In order to share in the development of new products.
6.	Objectives other than joint research itself.
7.	Other (explain in concrete terms).

Question 8. Overseas there are several examples of private firms operating laboratories such as Bell Labs that carry out very leading-edge research with a broad-minded outlook towards accepting outside researchers. The laboratories have played a leading role in the history of S&T.

What does your company think about setting up such a laboratory in Japan?  
 Circle one of the numbers below that corresponds to your answer.

No.	
1.	That kind of laboratory (department) is necessary, and we are already setting one up.
2.	That kind of laboratory (department) is necessary, and we are planning to set one up.
3.	Although we recognize the need for such a laboratory, our company does not think about setting one up.
4.	Bringing such a laboratory into existence in Japan's research climate would be difficult.
5.	A place like Bell Labs is an exception; even from a worldwide view, firms do not need such laboratories.
6.	Other.



Question 9. We inquired about the publication of the results in your company's basic research department in comparison with U.S. and European firms that are in the same kind of industry. Circle one number each, for now and in the future.

	Now	Future
1. We publish more than U.S. and European firms	1	1
2. We publish the same as U.S. and European firms.	2	2
3. We do not publish as much as U.S. and European firms.	3	3
4. We do not do basic research.	4	4
5. Other.	5	5

Question 10. As future goals for your company's R&D strongpoints in Japan, with respect to the following items does your company consider adopting the same or similar rules as those employed at your company's overseas R&D strongpoints or at overseas private firms' R&D strongpoints?

For each of the items below, indicate whether or not your company will adopt rules that have to do with that item by circling one of the numbers.

	Will adopt rules	Will not adopt rules	Other
Personnel matters, such as the employment and treatment of researchers.	1	2	3
Form of service.	1	2	3
Handling of research results.	1	2	3
Joint research with the outside.	1	2	3
Uniformity in the language(s) used (e.g., side-by-side English text).	1	2	3
Contributions by means of donations, etc.	1	2	3

## VI. Making Rules To Facilitate the Activities of Private Firms

Question 1. Circle one number for each region that corresponds to your company's situation with respect to troubles with overseas firms involving intellectual property rights.

	United States	Western Europe	Asian NIEs	Other
Increasing	1	1	1	1
No change	2	2	2	2
Decreasing	3	3	3	3

Question 2. What sort of S&T-related problems are there now and will there be in the future in your company's relationship with the United States?

Circle up to three numbers each for now and for the future.

	Now	Future
1. Problems relating to intellectual property rights.	1	1
2. Problems relating to export control laws.	2	2
3. Problems relating to antitrust laws.	3	3
4. Criticism that Japan gets a free ride on basic research results.	4	4
5. Criticism that Japanese firms in the United States keep their brilliant people closed in.	5	5
6. The growing difficulty in introducing technology.	6	6
7. The growing difficulty in accessing S&T information.	7	7
8. Existence of large technological gaps (with Japan in the superior position).	8	8
9. Ways of thinking about social contributions (donations, etc.).	9	9
10. No problems.	10	10
11. Our company has no connection with the United States.	11	11
12. Other	12	12

Question 3. In the R&D activities in which Japanese firms take an active part internationally, for which items would it be more desirable if there were a common, worldwide base?

Circle up to two numbers that correspond to your answers.

No.	
1.	An intellectual property rights system.
2.	A taxation system for R&D activities.
3.	Environmental regulations.
4.	Product liability.
5.	Regulations on the transfer of chemical weapons technology.
6.	Regulations with respect to relations with strife-torn countries.
7.	Product standards.
8.	The treatment of foreign firms in connection with subsidies and loans from each country's government.
9.	Local contributions by publication of basic research results.
10.	Nothing in particular.
11.	Other (explain in concrete terms).

Question 4. Is there any R&D (technology development) for global environmental problems being done in your company?

Circle one of the numbers below that corresponds to your answer.

No.	
1.	We are doing such R&D.
2.	We are investigating such R&D.
3.	We are not doing such R&D.

→ We ask the next question of those firms that answered that they are doing or investigating R&D for global environmental problems.

We asked about how your company's R&D relates to the global environmental policies being implemented by the governments of other countries. Circle one of the numbers below that corresponds to your answer.

No.	
1.	Technology that is expected to be put into effect by ODA (official development assistance) and funds from local governments overseas (afforestation of deserts by new methods, cleaning up marine pollution, etc.).
2.	The development of technology for coping with the government restrictions of each country that are expected in the future (regulations on carbon dioxide emissions, prohibitions on the use of CFCs, etc.).
3.	Without any direct relation to government policies, the development of technology that will contribute to the solution of environmental problems as a result of the effective utilization of tropical forests, more efficient recycling, etc.).
4.	Other.

Question 5. How do you think the state of affairs surrounding the activities of firms should change in order for firms to better contribute, whether directly or indirectly, towards solving global environmental problems by means of R&D?

Circle one of number each for the situation in Japan and the international situation.

The State of Affairs in Japan

No.	
1.	Rethinking Japan's legal regulations and other such systems.
2.	An expansion of the nation's support for R&D, e.g., subsidies, a tax-deduction system.
3.	National leadership such as in the establishment of research partnerships.
4.	Imparting the right knowledge to the citizens of Japan and raising their consciousness.
5.	Other.
6.	The situation as it is now is fine.

The International State of Affairs

No.	
1.	Because legal regulations and other such systems differ depending on the country, the standardization of those systems.
2.	The smooth promotion of international joint research.
3.	Leadership from the advanced countries (setting targets, promoting concrete policies, etc.).
4.	Developing countries' understanding towards global environmental problems.
5.	Mutual understanding with respect to the differences depending on the country in the recognition of the problems.
6.	Other
7.	The situation as it is now is fine.

Thank you for your cooperation.

- END -

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